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# THE BUILDING NEWS

## AND ENGINEERING JOURNAL.

### S. PAUL'S CATHEDRAL.

IT is to be deplored that the question of decorating S. Paul's Cathedral is destined to occupy so much of our time and space. We would gladly escape from a disagreeable duty imposed upon us, but we cannot. Rather than see a huge blunder perpetrated, which would cast discredit on the nation for generations to come, we must trespass on the patience of our readers. We have said much, and we fear we shall have to say much more, before the executive committee appointed to manage the business of adorning S. Paul's see the error of their ways. We are, however, not without hope that reasonable counsels will be ultimately listened to, and a wiser policy adopted. When we first made some observations on this matter, we stood alone. Since then the scheme of decoration as proposed by Mr. Burges has been almost universally condemned. In looking at the history of the movement up to the present time, we are surprised at three things. First, we are surprised that Mr. Burges was ever appointed to devise and superintend a costly and elaborate plan for decorating S. Paul's. Secondly, we are surprised that Mr. Burges should have proposed such a plan; and thirdly, that the executive committee who appointed him should persist in an injudicious course. We will offer a few observations under each of these heads.

First, as to the appointment of Mr. Burges. It is well known, (or in architectural circles, at all events) that he is, in a superlative degree, a Gothic architect. He, like other men, has his proclivities and preferences. He is zealous and enthusiastic. Hitherto, however, his zeal and his enthusiasm have been lavished on thirteenth-century Gothic. He has never shown, that we know of, any respect, even, for the Renaissance, or any of its manifestations. In fact, we believe up to a very recent period, and probably up to the present, he looks upon the Renaissance with disfavour, if not with contempt. But it so happens that S. Paul's Cathedral is one of the richest and ripest products of the Renaissance movement. Consequently, between Sir Christopher Wren and Mr. Burges there is a great gulf fixed, which no anxious friends or executive committee, however well intentioned, can bridge over. The fame of Sir Christopher Wren is indissolubly associated with the design and erection of S. Paul's Cathedral. England is proud of the memory of Wren, and of his great work. What Mr. Burges thinks of Wren and his Cathedral is also well-known amongst

architects. On one occasion Mr. Burges expressed his opinion before a meeting of architects, when he said that "the best thing to do with S. Paul's was to improve it off the face of creation." This was not a mere haphazard expression uttered to raise a laugh; but the logical outcome of Mr. Burges's mind, for he had gone to another source for his architectural teaching. This being the case, it was, to say the very least, a matter of surprise that Mr. Burges, with his peculiar antecedents and inclinations, should, of all men in the world, be selected to design and carry out an elaborate and exhaustive scheme for decorating S. Paul's; and particularly as Wren's "intentions," as far as they could be ascertained, were to be reverently followed. We venture to say that the Committee, in making such a selection, conspicuously exhibited their incapacity to perform the work they had undertaken. They began badly: they put the square man in a round hole. If they wanted a man to design a Gothic Cathedral, they would have made a good choice in selecting Mr. Burges. When this peculiarly unsuitable selection is more widely known, and its significance more forcibly seen—as it will be as the controversy deepens—public hostility towards the executive committee and Mr. Burges's scheme will necessarily increase in strength.

Secondly, we are surprised that Mr. Burges, after his appointment, should have gone so very far astray. His plan, in inception and development, is crude in character, fussy in treatment, and obnoxious to public taste. He asks for four hundred thousand pounds to veneer with marble the interior of S. Paul's Cathedral, and then he proposes to break up the surface with gold and garish colour, which, if consummated, would make our great Protestant temple, of which we are justly proud, more like a magnificent music-saloon or ginn-palace than a cathedral. We are not speaking exaggerated language. Let any one who wishes to test the accuracy of our statement go to the Royal Academy Exhibition, and judge for himself. Let him first look at a drawing on the wall of a staircase prepared by Mr. Burges for the Marquis of Bute. He will there see emphasised architectural forms made pretentious by obtrusive colouring. Then let him look at the model of S. Paul's, in the middle of the room, as prepared by Mr. Burges, and try to imagine how the Cathedral would appear if decorated in such an inharmonious, pedantic, and gaudy manner. Can the executive committee or Mr. Burges

really think they are carrying out Wren's intentions by subjecting the interior of the Cathedral to such ignominious treatment? Considering Mr. Burges's art partialities and tendencies, it could not be expected that he would have achieved a great success; but few expected he would have so signally failed to solve the problem submitted to him. We will not go over the ground we have before traversed by analysing in detail Mr. Burges's scheme. We consider it radically wrong in purpose, spirit, and treatment. It does not, in fact, contain a prominent redeeming feature. It is uncalled for, extravagantly expensive, incoherent in plan, and meretricious in effect; it is disrespectful to the memory of Wren; out of harmony with our national feelings and tastes; it would be attended with danger in execution, as the surface of the stone could not be taken away an inch and a half in thickness, to make way for the sham marble veneer, without weakening the pillars and walls of the building; it treats with contempt the ordinary canons of art by proposing to gild the stone capitals of the cathedral; and is destructive of the religious influences and associations of the place.

And this brings us to our third cause of surprise. Seeing that they have evoked almost universal opposition, they insist on pursuing a wrong course. They, however, invite "fair and definite criticism," and they ask for "confidence." Criticism they have had, and are likely to have, in abundance; and it is not unlikely that, should Mr. Burges continue to superintend the work, he will essentially modify his scheme. It will then no longer be the work of the executive committee or Mr. Burges, but something different, and probably something fragmentary and heterogeneous. The best thing the executive committee can now do is to begin *de novo*. They have made a mistake, and to err is human. It is far better to acknowledge the mistake than to persist in an injudicious policy. Let them now submit the matter to an unlimited competition; let them invite competitors from any land; and it is not unlikely, now the question has been discussed, that some scheme will be submitted worthy of the memory of Wren, of S. Paul's, and the British nation. By so doing, the executive committee will obtain the "confidence" of the educated public, and with that confidence will stream in the necessary funds for the "completion" of S. Paul's Cathedral. They have to remember that they are not the



custodians of a parish-church or a provincial cathedral, but of a pre-eminently national structure, reared by national efforts, and regarded with national esteem. They are, in fact, responsible to the British Nation now and hereafter.

#### LEICESTER-SQUARE.

**L**EICESTER-SQUARE is a name for conjuring up "monster hotels," cafés, panoramas, wax-work shows, and latterly, though not last, Wyld's great globe. The spot has ever seemed one of enterprise and rapid change. The Moorish and minaretted building of the Alhambra Palace has been probably one cause of the attractiveness to visitors, and one would think there was some contagiousness between the luxuriousness of the Bosphorus and filth.

Of all our open spaces in the metropolis, few have been allowed to become such an eyesore and disgrace as Leicester-square. Private interests, however, seem to have thus long baffled all legislative interference and ignored public interests. At last the time arrived, and Mr. Albert Grant, at a cost of £13,000, snatched away from a few apathetic shareholders this acre and a quarter of waste. It has not been rescued, however, without considerable trouble and litigation. Certain shareholders resisted all attempts at building on the site, which had been contemplated by Mr. Tulk's representatives or purchasers, and Mr. Bickers filed a bill in Chancery to restrain this proposal, while the Metropolitan Board of Works had also an iron in the fire by preparing a Bill in Parliament which has only just become law. Thus, between the struggle of proprietors, inhabitants, and public interests, we have secured the gardens, marble fountain, and statue which now adorn what has been, of late years at least, a disgrace to London. Curiously, too, this locality, which has been the acknowledged rendezvous of refugees and foreigners, was of all other parts of London, we should say, the least attractive for Frenchmen—the contrast between the boulevards, *plazas*, and gardens of the Continent being particularly poignant.

Even as far back as 1739, Maitland, it appears, spoke of the spot as being so infested with Frenchmen that a foreigner might imagine himself in France. The place, however, had then a very different appearance. Fashion had taken up its quarters there; it was called the "pouting place of princes;" the mansion of the Leicesters stood there; Sir Joshua Reynolds had a house on the west side of the square, and William Hogarth often threaded its enclosures. Illustrious names have thrown a halo round its precincts. Sir Isaac Newton, Hunter, Burney, Marquis de Colbert, and the Duke of Cumberland, lived in this locality. The Alhambra stands on the site of Hogarth's house, while Messrs. Puttick and Simpson's auction-rooms was once Sir Joshua Reynolds's gallery and *atelier*; and Dr. Hunter's residence is now the head-quarters of the 1st Middlesex Artillery.

We are glad to find these historic names are still associated with the recent improvements. The square is laid out with grass plats and flower beds, the corners being adorned with busts of white marble on granite pedestals of the following great men:—Newton stands at the south-west, Reynolds at the north-west, Hunter at the north-east, and Hogarth at the south-east corner. The busts are considerably above life-size, and are by Weekes, Marshall, Woolner, and Durham. The positions of the busts are near the houses of the original occupants. In the centre of the square stands a white marble fountain, forming the base to a statue of Shakespeare by Signor Fontana, being a reproduction of that by Scheemaker in Westminster Abbey. It is the first open-air statue of the great dramatist in the metropolis. The words, "There is no darkness but ignorance," are inscribed on a scroll. The base and fountain

are plain but bold, and will not detract from the statue. The square is laid down with grass plats, broad gravelled paths at right angles dividing the space into four quarters. A path also surrounds the square, and another the fountain basin. This latter is relieved by a bordering of flowers enclosed by an outer marble curb, and forms in appearance a portion of the fountain.

The iron railing is of elaborate design, and is executed by the Coalbrookdale Company, and is painted a chocolate colour and gilded. It is placed upon a Sicilian marble curbing, and at each corner (which is cut off by a straight cant) a semicircular arch of metal supports a lamp. The entrances are on two opposite sides. The works have been designed by Mr. Knowles, and the garden laid out by Mr. John Gibson, jun., F.R.H.S.; and the manner in which the corners of the enclosure are massed with rhododendrons, forming a background to the four corner busts, and the parterres which adorn the turf, is, we think, a very successful transformation to the deserted enclosure with its mutilated and unknown figure.

Let us hope its chequered history and its associations will now be more highly prized and preserved; that as it was once the haunt of artists, poets, and philosophers who adorned the Georgian period, it may still be frequented by future Newtons, Reynoldses, Johnsons, and Garriks, and that at least its respectability and character may be sustained by public care and pride.

#### HEAT AND ITS RELATION TO CONSTRUCTION.

**H**EA plays an important part in the economy of construction, and yet its effects are generally unheeded. Light and sound are readily discoverable by our eyes and ears, and therefore have received some attention on the part of architects and others interested in public assembly-rooms and halls. On the contrary, heat is a condition not so palpably perceived; and gradations of heat are still less evident, and therefore we are dependent, to a great extent, on the aids which thermometry affords. We are not concerned here in discussing the theories of heat, whether it be considered as a subtle form of matter, or caloric, as the "emission" theorists maintained, or whether it be simply the undulation of an imponderable elastic ether pervading space, and which physicists have now called the "Dynamical theory," or a *mode of motion*. The able investigations of Drs. Tyndall and Joule, and others, have shown "heat" and "power" to be convertible terms. The effects of friction, percussion, chemical action, all tend to establish the vibratory nature of heat, and to place it upon as secure a footing as the undulatory theory of light.

We propose here to indicate some of the common effects of heat in construction, and to show the disarrangements that may take place by great changes of temperature upon materials of different kinds, densities, and degrees of conductivity. As buildings are seldom composed of homogeneous substances of equable rates of expansion or contraction, it becomes a matter of some interest to consider what antagonistic forces are called into exercise by the combination of iron, stones, timber, &c., which are usually rigidly connected with each other, and how far these forces may, in course of time, or during a fire, impair the efficiency of construction, or the stability of the structure.

The expansion of metals is one of the most serious questions connected with structures, and is often instrumental in dislocating bearing parts of a building, and weakening the entire fabric. We have latterly recorded in these pages several instances in which iron employed in girders and columns, both cast and wrought, has aided rather than averted the

destructive action of fire and heat. In large warehouses in which iron girders form a complete network or frame within the brick or stone shell, the effects of any combustible material taking fire is to immediately cause such an expansion and pushing out of the walls that this disturbance alone becomes more thoroughly destructive than the ultimate power of the flames. The alternate action on such a building is first to push asunder the walls, and thereby dislocate all bearings, and then the same girdering or framework, becoming red hot, bends itself under the weight of floors or roofs, and either draws together again the walls, or what is most commonly the case, leaves its bearings and falls bodily inwards, to the total destruction of all internal parts. It is this double action which takes place in a fire that places iron in the unenviable position of a destructive agent, rather than as a resisting one. It is somewhat surprising that architects and engineers so frequently neglect this expansibility of metal in girders, ribs, columns, &c., and provide no means for their free movement. Sometimes, it is true, the bearings of long girders in bridges are made of sufficient depth to allow for this increase of length; but even in these cases the mere weight of iron and superincumbent loads upon the points of support render the intended result nugatory, the weight of the iron girder alone often creating so much friction on the bearing surfaces as to overcome the rigidity of the supporting piers or walls, or the cohesion of mortar at certain points. This immovability of the ends of iron girders and joists is often increased by their being clenched or fixed by the weight of wall above, which often improperly is allowed to bear upon the top flanges.

To obviate this, some engineers have contrived movable bearings more or less effective. One simple method we would suggest. Let each template be of cast iron of sufficient substance and bearing surface, and let it be placed upon an under template of stone or metal, the surfaces being either left smooth simply or brought into contact by a friction roller of small diameter, and of the length of the bearing surface. By this means free dilatation could take place, provided, of course, the ends of girders are left a free space of sufficient distance. No weight should be allowed to rest upon the ends of these beams, but in all cases the bearings should be free all round, and may be made as cast-iron sockets, built into the wall, or standing out independently.

The linear expansion a bar of iron undergoes when heated from the freezing to the boiling-point, or from 32° to 212° Fahrenheit, is about one 812th of its length; at higher temperatures the elongation becomes more rapid. Thus the progressive dilatation of wrought iron, as determined by Daniell's pyrometer, allowing one million parts at 62°, is as follows:—

At 212°.	At 662°.	At fusing point.
1,000,984	1,004,483	1,018,378

Cast iron is rather less.

It may be mentioned here that the expansions of volume and surface are calculated by taking the linear expansion as the unit, following a geometrical law, thus the superficial expansion is twice the linear; and the cubic expansion three times the linear.

These figures show how sensible a change takes place when iron undergoes an ordinary variation of temperature; and it may be said that in all ordinary cases of building this change is quite sufficient to cause serious disruptions of parts. Thus a bar or beam of even 10ft. long and subject to an ordinary change of temperature, say from 32° to 180°, will elongate more than 1/4th of an inch—a sufficient modicum to cause fracture in stonework, to snap the thread of a screw, or to endanger a bridge floor or roof truss. When we think of lengths ten and even a hundred times this dimension,



the danger of uncompensated expansion or contraction is increased a thousand-fold. In ordinary cases the margin of safety is really dependent upon the amount of flexibility or elasticity of the parts of a building connected with iron, or to imperfection of joints; yet we should not rest satisfied with such presumptive security.

It would appear that the most promising mode of using iron is in combining it with concrete, brickwork, and other materials; but it appears to us such a combination would be still more advantageous if the iron were completely imbedded or encased in such materials. Thus the "Dennett Arch" offers an example of a compact mass of concrete and iron, the girders being surrounded by the concrete spandrels of arching; there are also other systems of fire-proof construction (*e.g.* Hornblower's) in which the rolled iron joists are completely imbedded and ceiled underneath, and which seem to ensure the desired requisites, and which do not expose any considerable surface of metal underneath.

It becomes a serious question, then, How far may iron be used in the construction of floors and roofs without its endangering the actual stability of a building? Or to what extent can iron be used in conjunction with other materials?

Now, these questions turn upon the possibility of rendering iron less liable to the direct action of fire or heat. Metals are, we all know, the best conductors of heat. Physicists tell us the reason, *viz.*, because their internal structure is homogeneous and uniform; the particles are in close contact; and the vibratory or molecular movement which sets the heat waves in motion is, therefore, regular. All substances which cannot transmit molecular motion readily are bad conductors. Now, it is evident that, if we can combine these two opposite qualities in such a way as will neutralise or destroy the direct action of heat, and, at the same time, without unduly increasing the bulk of our floors and metallic framework, the great problem of how best to utilise iron in construction will be solved. It appears that there are some substances particularly bad conductors of heat; such are brick-earth, composed of a variety of bodies and porous; porcelain, asbestos, pumice-stone, charcoal, sand, &c. These substances are, in fact, such bad conductors that a red-hot iron ball may be held some time in the hand if it be first coated with one of them. Such materials offer themselves as coverings for iron girders, columns, &c., and we do not see why compound materials of a porous kind, as animal charcoal and plaster, should not be applied to such ironwork *in situ* by first filleting the girder or column, or surrounding it with a perforated plating of thin earthenware or metal on which to lay the coating, which could be run as moulded work or finished ornamentally. A lining or casing of such materials moulded to the form of the iron to be protected could also easily be prepared in cast blocks, rebated or grooved together, the external facing being moulded to any section. We do not know of any such preparation, but we throw out the suggestion to manufacturers.

Animal charcoal should be one of the ingredients in the compound used, as it is one of the worst-known conductors. Fireclay lumps could be well treated in this manner, or plastering—which materials have been suggested lately. Some success has attended the experimental testing of girders and columns cased in plaster and cement, the particulars of which appeared in the *BUILDING NEWS* some time since. A week or two since, the fireproof construction adopted at the National Safe Deposit Company's premises underwent a severe trial at the works of Messrs. Easton & Anderson, Erith, an experimental beam, cased in fireclay lumps, and coated with plastering, being subjected to the action of a continuous flame for one and a half hours, and to smouldering heat for twenty-four hours. The floor

thus subjected formed the top of the furnace, and was composed of two brick arches supported upon an iron girder cased as above, and was loaded to an equivalent distributed load of 3cwt. to the super. foot. A deflection of 3-16in. in centre took place. In about an hour after exposure to the fire, the plaster coating cracked, and came off in pieces; and the deflection increased for some hours after the fire was reduced till it reached 1in. and 3-16in., after which it diminished, and when the fire was extinguished by a stream of water and the load removed a deflection of 3-8in. remained. This deflection, however, gradually diminished, and the girder eventually regained its straightness. The fireclay reached a red-heat, but was found afterwards precisely as when put on, "quite uninjured," though some part of the brick side of furnace was forced by the heat out of the perpendicular, possibly by the thrust of the arches.

This experiment has successfully proved that iron protected with fireclay can withstand a fierce heat and yet remain uninjured in its elasticity, while the brick arching and concrete backing can resist any amount of heat likely to occur. We think if an air-space were left between such casing and the iron, it would provide a still more effectual barrier, though a few perforations would be required in the casing to allow the heated and expanded air to escape. If, also, brick-earth mixed with charcoal were used, a still more effectual non-conducting casing would be obtained, and the iron would be comparatively preserved at a moderate temperature. By thus encasing a good conductor of heat in a bad one, the evils of expansion and contraction are avoided, or considerably lessened, and we are thus left the advantage of using in our construction a material which may aptly be called a "good servant but a bad master."

Not only would non-conductive coverings act as protectors from heat, but they would obviate the inconveniences arising from condensation. Space prevents our consideration of this and other effects of heat, which we may leave to another article; in the meantime, however, we hope to find the promoters of the Amended Metropolitan Buildings Bill will consider the importance of casing iron likely to be exposed to fire, and the desirability of preserving powers to enforce the employment of fire-resisting and non-conducting materials; to regulate thickness of walls in warehouses, their horizontal and vertical division, and also to insist upon means of compensating for the expansion of iron under heat, and generally to exercise control in the arrangement of inflammable buildings.

#### ANCIENT IRISH ARCHITECTURE.\*

THIS excellent monograph of a peculiarly interesting and almost unique specimen of ancient Irish Architecture will enhance the reputation which Mr. Hill had previously gained by his "Illustrations of Ardferth Cathedral," "Kilmalkedor," and "Templenahoe," and which we noticed and reviewed on the occasion of their publication. This little chapel at Cashel, which Mr. Hill justly designates as "beautiful," was, as he informs us, commenced by Cormac M'Carthy, King and Bishop of Munster, in the year 1127 A.D., and completed in 1134. It is one among a number of buildings which are grouped picturesquely, though somewhat crowded, upon the top of the great limestone eminence known as the "Rock of Cashel." Mr. Hill says of it, enthusiastically, but with much truth, "Though small in size, it is picturesque in general form, adorned with well-executed detail, and displays in its construction an amount of skill and boldness almost unrivalled in any building of the age, and is justly considered the finest specimen in the country of the great Romanesque school of architecture. The group of buildings remaining on this

rock are a round tower about a hundred feet northward of this chapel, the chapel itself, and a large aisled cruciform cathedral thrust in between these two, and not parallel to the chapel. There is also a peculiar old carved cross at some distance to the west of the other buildings.

Cormac's Chapel consists of a nave about 50ft. by 14ft. internal diameter, with a sanctuary beyond about 14ft. by 11ft. inside, with a shallow recess or apse projecting from it, only about 3ft. deep by 5ft. wide. There are also two small towers, one about 13ft. square and the other 10ft. square, projecting from the opposite sides of the easternmost part of the nave. A rich but shallow porch also projects from the western portion of the north wall of the nave, which is now wholly hidden from sight by the choir and transept of the cathedral, which was built so close to the chapel that the transept wall touches its western wall, and that of the choir touches the angle of the north tower of the chapel. It will thus be seen that the chapel, in the dimensions of its ground-plan, assimilates to that of some of the small churches of about the same date and character built in England, of which we may mention Barfreton in Kent, and Kilpeck in Herefordshire as examples, and there are other points of resemblance between these several structures in many of their details. Cormac's Chapel, however, differs from all these others essentially, by its being a double-storied church, as complete, though smaller and less important, than that of Swaltz-Rheindorf, near Bonn, on the banks of the Rhine. Most probably relics were kept in the upper chapel, or "croft," as Mr. Hill calls it, and pilgrims may have ascended by the staircase in one tower, which still exists, and descended by one in the opposite tower, of which we only see three steps remaining in the section given in the work.

The north side was originally the principal one, and the porch there has a doorway in several orders, with detached shafts and richly carved; with sculpture in the tympanum of a lion crushing some smaller animals. The windows are remarkably small, but rich arcades cover the exterior and the interior of the lower chapel and sanctuary, and the chancel arch is a fine rich Romanesque example. The lower nave is barrel-vaulted, with plain square-edged ribs at short intervals, borne by attached shafts, and its sanctuary is groined, with roll ribs, domically. The upper church is surmounted by high-pitched stone roofs, "constructed on the corbel principle—each course having a horizontal bed, and overlapping internally until the sides meet and form the ridge. The masonry throughout is of great excellence, the material being sandstone. The croft, now a high pointed chamber in one height, was originally divided by a wooden floor carried on corbels into two levels. The upper apartment, reached by a ladder, was lighted by windows in the gables, while the lower room had two windows in the southern slant of the roof, and one on each side of the sanctuary roof. "At the west end a recess with a small opening in it was formed at some period, and is considered to have been a fireplace." If such supposition be correct, it would seem as if the use of the upper portion of the building had been as a dwelling or a retreat in case of danger, rather than a depository or shrine for relics, and the extreme plainness of this portion of the structure would favour this opinion. We have said enough, however, to show that Cormac's chapel is a work of great interest and much beauty, with considerable peculiarities of arrangement and structure, which, no doubt, present debateable subjects for archaeological research. To Mr. Hill's complete rendering of it, accompanied by good photographs taken by Mr. Hudson, of Killarney, we are glad to be able to award much praise, and we hope he may continue the series of illustrations of these remarkable works of architecture in Ireland.

\* "A Monograph of Cormac's Chapel, Cashel, Co. Tipperary." By ARTHUR HILL, B.E.



## HISTORIC ART STUDIES.

## ITALIAN SCULPTURE—FIFTEENTH CENTURY.

(With Double-page Illustration.)

AND the stone has become flesh again! That which was too realistic on one side, and too spiritual on the other, was united in Italy during the fifteenth century into harmonious combinations, and led art by degrees to the production of the greatest masterpieces in stone and colour. Whilst the Greeks brought their sublime ideals of gods and heroes to perfection in the beautiful human form, and tried to generalise in shapes of men and women the impressions which the very forces of nature made on their sensitive and poetical minds, we find Christian art, after fourteen hundred years of spiritual and sanguinary struggles, rising like a phoenix from its smouldering Mediæval ashes. The conventional generalisations are to a certain extent abandoned, and individual freedom steps into its rights. Humanity has grown older and wiser. The disturbed balance of the static and dynamic forces working in mankind was to be adjusted: spiritually and scientifically in the North of Europe, and materially and artistically in the South. Beauty was no more to be sought for in gloomy asceticism, and art was freed from ecclesiastical mysticism. The exclusively realistic stiffness in the monotonous representations of saints and prophets was to lose its angular sharpness, and to assume broader and more natural forms without forfeiting repose, ideal beauty, and truthfulness. Heavenly ecstasy was to be counteracted by earthly loveliness, and the terrible antagonism, which unduly degraded the body and exalted the soul, was to cease under the influence of a better understanding of the real aim of art.

In poetry and literature, in wealth and civilisation, Florence stood at this period in the van of Italy and Europe; and this position had its effect on her architecture, sculpture, and painting. Art was no more exclusively sacred, but became also profane. Incidents of every-day life were frequently mixed with scenes from the Old and New Testament. It is characteristic of the tendencies of this century that representations taken from the Old Testament become rarer, and that the revival in art may be said to have been also a great revival of Christ's teachings. The resurrection, not only of the Lord, but the resurrection of higher and more humane feelings in general, was celebrated in Italy under the eyes of intolerant dogmatists, who were forced to bow to the more refined artistic spirit of the times. Beauty conquered, step by step, the dreary domains of casuistry, in order to rule once more supreme in the realm of art. We have done ample justice to the exquisite naturalism of Gothic sculpture, fettered by narrowing architectural lines, forming the transition link, preparing the artists for the more advanced state of plastic art, which in its turn must be looked upon as the transition phase from sculpture to the highest development of pictorial art. Landscapes with light or heavy clouds, mountains, trees, and towns were perspectively arranged in bronze, stone, terra-cotta, or marble. This grouping is often most ingenious. The front figures are prominently detached from the ground, whilst those in the background are more and more flattened. Great as our feelings of admiration may be in contemplating the masterpieces of this period, we cannot refrain from warning artists to beware of imitating them. The principles of plastic art are altogether violated, and sculptures are turned into pictures; the chisel was used as a paint-brush, and the paint-brush very often as a chisel.

Lorenzo Ghiberti and some of his contemporary artists carried out in bronze what Niccolò Pisano began in marble. Ghiberti was more fortunate than his predecessors, for architecture underwent a thorough change. Walls were properly used, and numerous

friezes, cornices, consoles, frames, niches, and straight lines forming pediments and pedestals afforded opportunities for ornament, or proved receptacles for statuary. The spectral finials with shapeless knobs, intended to represent lilies or roses, disappear. The grinning devils, Saracens' heads with protruding tongues, monks with withered faces, haggard nuns, dragons and serpents huddled together with owls and pigeons, vanish. Men and women in their beautiful natural shapes decorate churches and palaces, and interrupt the crowning horizontal lines of the buildings. Greek art rises in form, though it is spiritualised by the Christian spirit of the times. Large square gates superseded the depressed and pointed-arched entrances of cathedrals. There was now room for paneling, and panels were at once filled with pictorial sculptures. Classic art in Italy never died out altogether; it was always latent there, and awaited only the necessary current to flash forth in all the vigour of refined taste. This occurred first in literature. From the times of Petrarch the Italians devoted themselves to a more careful study of the Greek classics, and Francesco Squarcione went out to Greece to study antique forms, in order to gain a correct basis for works of art. Roman antiquities were investigated by Brunellesco and Donatello, who endeavoured to trace the lost thread of progressive development in art, to take it up and to unite once more the old Classic world with the better understood principles of Christianity, the fundamental doctrines of which were disturbed by Hindoo-Buddhistic and Egypto-Hebrew interpolations both in theology and art. We must not think that results were immediately visible. Such changes require time. Before the hand is capable of executing works of art the mind must be trained in individuals as well as in whole nations. The ecclesiastical and Gothic forms gave way but slowly. The deteriorated taste was not at once purified by a thorough understanding of Greek Art; it was first attracted by the more pompous Roman reliefs, with their overcrowded groups. This Assyro-Egyptian style accorded well with the taste of the Hindoo-Buddhistic Christianity, then still ruling the minds of the European world. It is true that the figures lost their stiff regularity, but they forfeited also the repose and simplicity of their drapery. The artists reproduced minute details, they were bent on imitating every wrinkle, every muscle and sinew. They would gladly have counted the leaves on a tree and cast or chiselled the exact numbers with slavish accuracy. They studied models and copied them with a revolting realistic fidelity. There was something Netherlandish, precise, and objectionably low in the first productions of this period. A Teuton master from Cologne, Pierro di Giovanni Teutonico, or Pietro di Giovanni Tedesco, mentioned by Lorenzo Ghiberti, undoubtedly inaugurated the first attempts at a freer art. In this better style worked Jacopo della Quercia and Niccolò dell'Arca, till Lorenzo Ghiberti bore away the palm. Equally powerful in rich composition, and in technical execution, we may say, Ghiberti was the resuscitator of Classic feeling in art. He was assisted in this by Luca della Robbia, Donatello, Verocchio, &c. In placing before our readers twenty-one illustrations of this period we must refer both to their merits and demerits.

The Resurrection of Christ (see Fig. 1), a terra-cotta relief, by Luca della Robbia (1399-1488), is conceived and executed in the spirit of the fifteenth century. The composition is carried out in accordance with the strictest rules of symmetry. The central figure is on both sides surrounded by corresponding groups. The ministering angels, these airy conceptions of our imagination, assume the forms of lovely nymphs and oreads. Christ hovering over his open tomb is a noble figure, with kindness and love spiritualised in his features. A poetical

idealisation and a deep understanding of the Classic arrangements of pediments pervade the composition. Andrea Verocchio (1432-1488) was, in his naturalistic sharpness, like Donatello (1386-1468), a thorough Teuton. His colossal bronze statue of Bartolomeo Colleoni (see Fig. 2), erected at Venice before the Church of S. Giovanni e Paolo, is one of the most important monuments of this period. The horse is trotting, and is a perfect masterpiece, worthy of a Myron, in uniting the two conflicting elements of repose and movement. The figure of the general is stiff and heavy, but full of military grandeur. The armour, perhaps, excuses the brutal clumsiness of the proud warrior. No one can accuse the sculptor of idealisation; his tendency was to be as realistic as possible. The statue of Cosmos I. (see Fig. 3), by Giovanni da Bologna (1524-1608), is only given to enable us to draw comparisons between the art-products of the fifteenth and those of the sixteenth century. The statue of Verocchio is bold and realistic, whilst that of Bologna is idealistic and refined. The horse of the former is life-like, whilst that of the latter is conceived in a spirit of exaggerated elegance. The representation of Bologna is full of grace, and not without an attempt at Classicism, which is apparent in the antique drapery hanging from the duke's shoulder. Colleoni's simple and crude appearance is a dry contrast to this. From the altar of the small church, "Misericordia," at Florence, we give the statue of the Virgin Mary with the Child (see Fig. 4), by Benedetto da Majano (1442-1498). An excellent wood-carver, this artist distinguished himself early by his exquisite panelings. Ornamentation received through him a new impulse. Taste and variety, well balanced by moderation in the division and subdivision of the subjects, were his principal characteristics. The marble statue of the Virgin is, however, too wooden, and the child disproportioned and graceless. Far better is the statue representing Strength (see Fig. 5), from the tomb of Ladislaus and Johanna II., erected in the Church of S. Giovanni a Carbonara at Naples. The tomb itself is in the Gothic style, but the statues are decidedly Renaissance. A charming woman with lovely features bearing part of a column is chosen to express symbolically Strength.

Whilst Ghiberti strove to idealise, Donatello, less inspired by love for the Antique, tried to be as vigorous and correct in outward forms as the materials used would allow. Nature, in all her naturalness, was all he tried to reproduce. His S. John is an excellent study for bones, sinews, and veins; his horses look as coarse as his riders; but his mighty grouping deserves to be studied. Exaggeration marks the details; a haughty and powerful spirit pervades the whole of his compositions. This is the case with his bronze relief from the pulpit of S. Lorenzo at Florence, representing the Descent from the Cross (see Fig. 6). The background is filled with riders, reminding us of the Panathænaic procession. In the foreground lies Christ, just lowered from the cross, in the arms of his disciples, surrounded by all those to whom he was dearest. Grief and despair are expressed in the most different forms and degrees. Repose is thus marred by the details, and the whole work is transformed into a sensational attempt to produce as many distorted faces as possible. The Annunciation, a marble relief by the same master (see Fig. 7), from one of the side-altars in S. Croce at Florence, is somewhat less realistic, though the proportions of the Virgin are neither correct nor graceful. Next to Donatello in realistic tendency stood Brunellesco (1377-1446), of whom we give Christ on the Cross, carved in wood (see Fig. 8). The sculpture originated from a crucifix carved by Donatello. When Brunellesco saw the life-like form nailed to the cross in Donatello's studio, he exclaimed indignantly, "This is a low peasant, but not Christ!" and attempted him-



self a work which should be truthful, but at the same time idealised through the expressions of divine love and suffering, of sublime grandeur and heavenly beauty. When Donatello saw Brunellesco's Christ, he humbly exclaimed, "Well, I see I am only fit to carve peasants; you can carve a Christ." Some of our modern painters might well follow this example, and acknowledge themselves unfit to paint a Christ, but perfectly competent to paint "shavings."

Christ with the sculptors and painters of the fifteenth century was still conceived as having died broken-hearted on the cross, whilst at a later period His head is elevated, and His features are illumined by divine satisfaction that the redemption of humanity has been at last accomplished. The bas-relief from the Certosa at Pavia (see Fig. 9), ascribed to Amadeo and Andrea Fusina, and that from the triumphal arch erected in honour of Alphonso I. of Naples (see Fig. 10), are in the style of the reliefs from the Trojan Column, though less coarse in the technical execution. Jacopo della Quercia (1374-1438), of Siena, worked in the manner of Donatello. His realism was, however, softened to a great extent by gentleness in grouping. He distinguished himself in the decoration of the principal portal of S. Petronio at Bologna. The relief (see Fig. 11) is taken from the side-pilaster, representing Adam and Eve after the Fall, when they had to commence labour. Eve spins, Adam is digging, and two lovely boys cling to their mother, forming an exquisite and homely group. The curse of labour is, in a true Christian spirit, already turned into a blessing. Some modern Iconographers doubt whether these reliefs are the work of Quercia.

The two next reliefs (see Figs. 12 and 13) are from the Eastern portal of the Baptistery at Florence, by Lorenzo Ghiberti (1381-1455). The whole portal is to be seen in an admirable cast in the South Kensington Museum, on the staircase leading to the male school. Michael Angelo said of Ghiberti's portals that "they were worthy to be the Gates of Paradise." The reliefs, which are in bronze, represent scenes from the Old Testament, ten in number, five on each wing. The subjects were chosen by Leonardo Bruni da Arezzo, the celebrated Chancellor of the Florentine republic. Nothing could excel the masterly grouping, the variety of figures, and the exquisite and delicate treatment of the details. We have before us splendid pictures worked in bronze. Fig. 12 contains the whole Biblical history of the creation of man. The Creator bears the serene features of Jupiter Olympus; Adam looks like Hercules, and Eve has all the charms of Venus. The group of sorrowing nymphs and naiads as angels is unsurpassed. There is an indescribable charm in the unaffected composition, and in the Classic treatment of the nude; whilst in Fig. 13, representing the Israelites under Joshua passing over the Jordan and marching against Jericho, the composition and grouping are grand and sublime. The river, the landscape, the town, the various groups in the fore and background are combined into one harmonious pictorial whole, and we have only to regret that the work is not an oil-painting or a fresco. The powerful imagination and the delicately refined technical execution of this immortal master may be studied in the arabesques adorning the frames of the portals (see Figs. 14, 15, and 16). The statues, flowers, leaves, fruits and birds are all worked with idealised naturalness, interesting in the history of art as so many links of transition from plastic into pictorial art. The Adoration of the Wise Men (see Fig. 17), the Annunciation (see Fig. 18), and the Entry of Christ into Jerusalem (see Fig. 19), are scenes taken from the northern portals of the Baptistery, the older of the two gates. The twenty-eight panels contain the Evangelists and four fathers of the Church, and twenty scenes taken from the New Testament. The

style of these compositions is less pictorial, and therefore preferable, from a plastic point of view, to that of the Eastern gate. The scenes are not so crowded and the landscape less marked; the loveliness of the figures and the correctness of the grouping remain models of ornamentation for ever. "Angels singing," bronze reliefs by Donatello (see Figs. 20 and 21) may serve as specimens of that tendency which boasts exclusively of "nature," and discards all higher idealisation and intellectual treatment of art. Whilst Ghiberti was the founder of the Ideal school in sculpture, Donatello may be considered the originator of the Realistic school. The two reliefs representing singing angels from the altar of S. Antonio at Padua are truthful, but stiff and vulgar; the angels are well-fed boys, but there is very little that is angelic in them.

"Mens sana in corpore sano" resounded like a "Te Deum" through the artistic world, and brought about harmony between form and spirit. Plastic art predominated in Italy till 1450, when the real element of Christian art—painting—gained the ascendant. Plastic art had to retire, and to serve as a means of ornamentation for pulpits, chairs, candelabra, goblets, chests, and baptismal fonts; sometimes being exceptionally used for altars, where subsequently paintings began to rule supreme. In colours we can speak so much more quickly and intelligibly than in bronze, terra-cotta, or marble. Colours are best adapted to express deep sentiments and passionate feelings. The idealisation in plastic art is restricted and confined to the outer form; whilst in painting it pervades the very material with which the artist produces his effects. The form in painting is much, but it is not, as in plastic art, everything. The mirror of the soul, the eye, is not wanting in painting, but becomes the reflex of love, tenderness, jealousy, rage, or heroic self-sacrifice. Christianity has freed humanity from the fetters of cold formalism, and has given us the power to spiritualise our works of art, and to dive into the secret depths of an intellectual nature. A neglect of the ideal in art is Hebrew-Egyptian heathenism, and contrary to the pure element of Christianity, which consists in an idealised deification of humanity.

G. G. ZERFF.

#### ARCHITECTURAL ASSOCIATION.

THE last meeting of this Association for the present session was held on Friday evening last at 9, Conduit-street, Mr. E. J. Tarver, President, in the Chair.

Mr. PAICE said that the members' voting papers for the election of officers had been received, and he moved that Messrs. Langford and Sidney Vacher be appointed scrutineers. The motion was seconded and carried, and the scrutineers reported at a subsequent period of the evening that the following gentlemen had been elected

#### OFFICERS FOR SESSION 1874-75.

*President:* Mr. George H. Birch, A.R.I.B.A.  
*Vice-Presidents:* Messrs. John S. Quilter, A.R.I.B.A., and Bowes A. Paice.

*Committee:* Messrs. H. C. Boyes, T. W. Cutler, E. Flint, J. Johnson, A. H. Kersey, W. Ravenscroft, W. W. Robertson, R. P. Spiers, J. Sulman, and E. J. Tarver.

*Treasurer:* Mr. J. Douglass Mathews, A.R.I.B.A.

*Solicitor:* Mr. Francis Truefitt.

*Auditors:* Messrs. H. H. Stannus, A.R.I.B.A., and P. J. Marvin.

*Librarian:* Mr. Walter L. Spiers.

*Assistant Librarians:* Messrs. R. E. Pownall and L. A. Shuffrey.

*Secretaries:* Messrs. S. Flint Clarkson, A.R.I.B.A., and E. G. Hayes.

*Registrar:* Mr. John S. Quilter.

*Collector:* Mr. Alfred Hill.

On the motion of Mr. Paice, a hearty vote of thanks was tendered to Mr. James Brooks for his kindness in conducting a large number of members of the Association over some of his new works at Shoreditch and Haggerstone, as reported in last week's BUILDING NEWS.

Mr. Paice having called attention to the list of prizes, which appears in another portion of this impression of the BUILDING NEWS,

Mr. F. C. PENROSE, Architect to the Dean and Chapter of S. Paul's, read the following paper

#### ON THE INFLUENCE OF THE ITALIAN CINQUECENTO ON THE EARLY FRENCH RENAISSANCE.

The Cinque-Cento or Renaissance style or phase of architecture has, and deserves to have, great interest for us. It is perhaps the most plastic style on which we can base our modern architecture. It has not the grandeur of the Egyptian nor of the Greek, nor has anything been achieved in this style which can compare in dignity with the earlier Gothic or Romanesque—in this term including the best specimens of our own Norman, and I venture to call the Romanesque even more solemn than the thirteenth century Gothic. It must be granted, however, that the Renaissance, properly so called, has been used (that is fundamentally) in so few of the more important cathedrals and churches of Europe, that its capabilities have never been brought out. Still, I think we are justified in thinking of it rather as suitable to civil, palatial, and domestic purposes, than to ecclesiastical. In speaking thus of the Renaissance, I exclude S. Peter's at Rome and other churches, such as S. Paul's, built on the fully-developed revived Classical idea, from this category altogether. In this place I neither affirm nor deny that these may compare with those of any other style; but I am speaking of S. Eustache, Paris, and S. Pierre, Caen (*i.e.*, the choir), and, in Italy, of such designs as the front of the Certosa of Pavia, which may, indeed, and I think do, compare favourably with the later Gothic, but not with the earlier. But leaving alone the question of the suitability of the Renaissance architecture for ecclesiastical buildings, I venture to offer it, as an opinion formed upon the study of many years, that for buildings not ecclesiastical the greatest success for modern purposes has been obtained in the Renaissance style. In Italy there is nothing to surpass the Venetian palaces built by Sansovino and San Michele; by San Michele at Verona, by Bramante and Baldessare Peruzzi at Rome, and at Genoa by Galeazzo Alessi. In Spain the finest results are all of this period, and in the first rank I should quote the Town-hall or Ayuntamiento of Seville. And, in France, the palaces of Chambord and the older part of the Louvre would alone suffice to give to this style the first rank in that country for palatial architecture. [Having glanced at what was being done simultaneously in other countries, this part of the subject being elucidated by a chronological table, Mr. Penrose continued as follows]:—The arts which took so deep a root in Greece were exotic among the Romans, but they were fashionable, and patronised by the great. There were, however, other races in Italy, of Greek or Etruscan origin, with whom they flourished naturally, and amongst their descendants they ultimately revived. Wherever classical antiquity had left important traces, the Mediæval architecture and sculpture was deeply influenced. For instance, in the south of France, especially in Provence, but in some other districts also, details of Romanesque work are to be met with which it requires some discrimination to distinguish from Classical work. Nor is this surprising. Even the northern architects thought they were following out and reproducing the forms of Classical architecture, and we owe much, if not most, of the originality shown in their works to this difficulty of access to the ancient models. This separation of the Northern artists from the ancient models, however favourable it may have been to the development of a new style of architecture, was not advantageous to that of the sculpture of the period, and it was from Italy that the influence came which, although for a very limited period, brought up the Mediæval sculpture to a very high state of excellence. To the famous Niccola da Pisa the credit may be assigned of this reform, which, beginning with his works about 1225, at Pisa and Siena, extended gradually to Rheims, Westminster Abbey, and Lincoln. The impulse was, however, soon lost in northern Europe, and the sculpture of England and Germany degenerated much more than did the architecture; more, at any rate, than the English Perpendicular. Whilst the Italians, by the hands of Masuccio, were executing those wonderful works, almost Greek in their dignity, the Royal Tombs at Naples, and whilst Giotto, born 1276, laid the foundation of the great Italian school of painting,



himself among the greatest, these arts in the north of Europe were in a very low condition. This Italian search after excellence in sculpture and painting was accompanied by an extraordinary desire to recover the lost or buried literary treasures of antiquity; and Dante, born 1265; Boccaccio, born 1313; and Petrarch, 1327, were among the most influential and the most laborious in bringing the lost treasures of learning again to the knowledge of their countrymen, and through them gradually to the rest of Europe. To these names must be added that of Poggio Bracciolini, who lived, however, towards the end of the fourteenth century. In England, Chaucer, born 1328, soon responded as an author, but we went on for about a century and a half, after he began to write, before the Mediæval arts of architecture, sculpture, and painting, having run down to their lowest ebb, were reversed by the flood-tide of the Renaissance. Both in England and France this turn of the tide was nearly contemporary. The French, however, had still more reason than ourselves for hailing the new style. In our Perpendicular we had achieved at least one building worthy of all time. I need not name King's College Chapel, Cambridge; whilst in France there was nothing but the fritter and pettiness of the Flamboyant, and probably in consequence the Renaissance took more decided and stronger root in France than in England. Florence, the birthplace of Dante, led the way in the pursuit of the revived knowledge of Classical antiquity, and this revival in the direction of the arts was taken up and advanced almost to its maturity by Brunelleschi, born in 1377 (and who therefore was a boy nine years old when William of Wykeham completed New College, Oxford); by Donatello, born 1383; by Ghiberti, contemporary of the last, and sculptor of the beautiful doors of the Baptistery of Florence; by Lucca della Robbia, 1399; and by Alberti, born 1404, whose designs at Rimini and Mantua have never been surpassed, and whose book *De Ædificatoriâ* produced a great effect; followed up by Bramante, born 1444, who groups naturally with those previously mentioned as the authors of the Italian revival of the fifteenth century, not yet the Cinque-Cento. The sixteenth century opens with the maturity of Sangallo, Michael Angelo, Sansovino, Peruzzi, Raffaele, and San Michele. The list of the names of the earlier Renaissance architects and architectural artists may be allowed to close with Benvenuto Cellini, Vignola, and Serlio, who was born in 1510. Florence, as before mentioned, led the way with Brunelleschi; Rome followed much later with important buildings, especially the Cancelleria, by Bramante. Verona and Venice were much behind Florence, the Madonna dei Miracoli, 1480, being about the earliest building in the new style, and that only partially developed. Genoa was still later with the works of Galeazzo Alessi (born in 1500). In Milan, the Ospedale Grande, begun in 1456 by Filarete, a Florentine, is a noble transitional building, which shows the influence of Brunelleschi so far as it is of the Renaissance character. Out of Italy, Germany (and especially Nuremberg), was the first to receive the new principles, and to advance them by the hands of Adam Krafft (about 1430), Peter Vischer (born 1460), and Albert Dürer (born 1471); and Basle produced another great artist, Hans Holbein (born 1498). The example and the school of Albert Dürer had great influence, but the impression made upon Germany seems to have been much impeded by political troubles, and the results have not been so great in works of the Renaissance character as elsewhere. To this family, however, may be assigned the Townhall at Antwerp, a very fine example; also one of the most remarkable works in Europe—the tomb of Maximilian at Innsbruck, made about the year 1510. The Flemish school of glass-painting bears evidence of Italian influence. The cartoons for some of the magnificent painted windows in the Sacrament Chapel of S. Gudule, Brussels, were drawn by a pupil of Raffaele; and the windows which once adorned the monastery at Herkenrode, and are now in the Lady Chapel of Lichfield Cathedral, and which bear nearly the same date as the windows at Brussels (1530) point to a similar source, although the artists' names have not been preserved, as at Brussels. Thus we have seen that in Italy the general revival of Classical architecture began in Florence, and with Brunelleschi whose first work was the Ch. of San Lorenzo, the date of which would be about 1421. It was then received in various parts of the North of Italy, as at Rimini, Mantua,

and Milan; then by Rome and Venetia, San Michele importing into the Veronese and Venetian examples much that he had gathered from his own studies of antiquity. Germany followed, and through the influence of Henry VIII. it was received in England some years before it took any hold upon France; but it did not take so much root amongst us as it did in France for some time. In France and Spain it was received about contemporaneously. In describing the sculpture of the late French Gothic as degenerate, a remarkable exception must be made in favour of some works at Dijon, where are the tombs of Philip le Hardi and Jean Sans Peur, and the celebrated Moses Well by Claus Stuler (who, by the way, was a Dutchman, invited thither by Philip le Hardi, Duke of Burgundy), all of which are in a very fine style of sculpture. One of the earliest and most characteristic of the Renaissance efforts in France connected with church-architecture is the eastern portion of the Church of S. Pierre, at Caen. The whole idea of the structure is Gothic, but the details are to a great extent Classical. About the time when this was built (1521) the exquisite arabesques of S. Michele de Murano and Sta. Maria dei Miracoli, in Venice, had been finished not less than thirty years: those of the beautiful Badia di Fiesole, by Brunelleschi, more than fifty years; in all of which the framework of the structure is in harmony with the detail; but in this specimen at Caen there is a struggle between the two styles which is very curious, and however much the judgment may be puzzled the eye is pleased, and we feel inclined to say that we find

"Something of the Northern spell  
Mixed with the softer numbers well."

There is a play of fancy and fine outline and chiaroscuro in this example, which is to be found in a much less degree in the more fully-developed and larger example of S. Eustache, in Paris. The chief difference between the first Italian and the first French examples has already been indicated—that the French only borrowed the detail, whilst still employing the general form derived from the Gothic. In this example at Caen we have buttresses with angular attached pinnacles, but the body of the buttress is made to suggest a square pilaster with an exquisitely-worked Cinque-Cento capital. And there is planted upon it a smaller pilaster set anglewise, carrying a tapering candelabrum-like composition, which answers to the sloping top of the pinnacle. The windows have mouldings essentially Gothic in character, but they are semicircular. The pierced parapet, so characteristic of Flamboyant architecture, is there, but the tracery has taken the form of a stout species of arabesque. The designer seems to have felt that having thus imparted a bold character of arabesque he must also reproduce it to some extent where arabesques are used on the wall-surface; and hence arises one of the greatest elegances of the French Renaissance, viz., that there is a great variety between the more salient and bulkier parts of the arabesques and the more delicate, which parts are almost as tender as in the Venetian examples, whilst the total effect is more powerful. The Italian arabesques, on the contrary, are apt to err on the side of weakness. The Spanish occupy an intermediate place in this respect, but are nearer to the French than to the Italian. S. Eustache is certainly a fine church, but it seems to show very little originality. In this respect the smaller example of S. Etienne du Mont, with its rood-screen and the staircases leading up to it, has more to recommend it. There are several ecclesiastical works in this earliest Renaissance in various parts of France. The screen round the choir at Chartres, date 1525, by Jean Texier; the monument to Louis XII., at S. Denis; that to Cardinal Amboise at Rouen (date 1529) may be specially mentioned. This monument was the work of Roulaut de Roux, master mason to the Cathedral. The invitation given by Louis XII. to Giocondo de Verona in 1499 probably led to his forming a school of pupils, whom he instructed in the Italian details without immediately, at any rate, being able to influence their entire practice. In the meantime, England was brought into the growing fashion by Henry VIII. inviting Torregiano, a Florentine, to put into the new chapel at Westminster the monument to his father. The bond or indenture for this monument given by "Torrisany," as he is called, is dated 1516. Torregiano's hand is also probably to be found in the fine Renaissance screen and stalls, scarcely inferior to any similar works, added in the reign of Henry VIII. to King's College Chapel, Cambridge.

The designs for the painted windows of the same chapel—date of indenture 1527—have been referred with some probability to Holbein, who was at that time established in England.

(To be concluded.)

## ARCHITECTURAL ASSOCIATION PRIZES.

THE following prizes are offered by or through the Architectural Association:

OFFERED BY THE ASSOCIATION.

To Members of the Association: A prize of two guineas and a half for the best essay on either of the following subjects, viz.: 1. A Monograph of the late Professor C. R. Cockerell. 2. The influence of material on Gothic architecture. 3. On the comparative advantages of vaulting and open timber roofs.

To Members of the Class of Design: A prize of two guineas and a half for the best series of sketches contributed in the class during the session; and a prize of one guinea and a half for the second best series.

To Members of the Class of Elementary Design: A prize of one guinea and a half for the best series of studies submitted during the session.

To Members of the Class of Construction: A prize of two guineas and a half for the best series of papers submitted at the meetings of the class, and a prize of one guinea and a half for the second best series.

To Members of the Class for the Study of Colour Decoration: A prize of one guinea and a half for the best series of sketches submitted during the session.

OFFERED BY THE ARCHITECTURAL UNION COMPANY AND THE ASSOCIATION.

To Members of the Association: A prize of five pounds for the best series of measured drawings from existing buildings in England, or portions of the same erected previous to the eighteenth century. A prize of two pounds ten shillings will be given for the second best series. The object of this prize is to obtain a series of drawings showing construction, the jointing and bonding of masonry, and general framing of timbers. Detail drawings to be made to a scale of not less than half-an-inch to a foot, and mouldings, &c., at least one quarter full size.

FROM THE PRIZE FUND.

To Members of the Association: Five prizes of the value of five guineas each are offered for the following subjects:

1. Design for a cloister to a public building, illustrated by plans, elevations, and sections, to  $\frac{1}{4}$ -in. scale. Details on one sheet or two half-sheets of double elephant paper. Perspective in line or one tint.

2. Design for a Royal Tomb, illustrated by plan, elevations, and sections, to  $\frac{1}{4}$ -in. scale. Details on one sheet of double elephant paper. Perspective in line or one tint.

3. Design for a small villa to cost £1,500, illustrated by plans of each floor, elevations and sections to  $\frac{1}{4}$ -in. scale. Details of wood and stone-work &c., on two sheets of imperial paper, to  $\frac{1}{4}$ -in. or larger scale. Complete specification of materials and mode of workmanship sufficient for carrying out.

4. Design for decoration in colour of a baptistry (attached to a church) polygonal on plan, 20ft. diameter, illustrated by general perspective view of interior of baptistry on half-sheet of double elephant paper (not necessarily coloured). Detail of decoration of one bay to  $\frac{1}{4}$ -in. scale, with sufficient colour to give general effect; with as many details as will fill one whole sheet, or two half-sheets, of double elephant paper.

5. A money prize as encouragement for architectural sketching. Members competing to send in any sketches or measured drawings, not exceeding ten sheets, and not more than two sketch books, extending over as long a period as possible. The sketches and measured drawings made by the competitors to be exhibited at the conversazione in October.

Further particulars may be had of the hon. secretaries, 9, Conduit-street, W.

Mr. Alfred Lawrence, of the well-known firm of Lawrence & Sons, builders, has been re-elected by the Shoreditch Vestry to represent it at the Metropolitan Board of Works.



## CAPE COLONY.

[FROM OUR CORRESPONDENT.]

**E**IGHT designs have been received from the Crown agents by M. S. Asiatic in Capetown, for the erection of new Houses of Parliament there, and one set only has been sent in from a colonial architect. None of the designs have, as yet, been opened, and it is probable that no decision will be made till Parliament shall meet, which will be on the 27th inst. We understand that colonial architects withheld from the competition, feeling unable to comply with the conditions laid down. The late Government of the colony obtained designs on a former occasion, and awarded a premium, but nothing further was done. A responsible form of Government, however, being now established, it is believed that this, with other public works, will go ahead.

It may interest some of your readers to know under what arrangements Government at the Cape carries out its public works, which, until lately, were limited to harbours, bridges, roads, and buildings, and these were under control of the Public Works Department, the chief inspector of which is M. M. R. Robinson, M.I.C.E., and with him a staff of engineers and draughtsmen, stationed at different parts of the colony, as work demands. At the first, too, what little railway work there was, this department also carried out. Since, however, the accession of a Responsible Government, a great impetus has been given to railway work, and it was deemed necessary to create a separate railway department, which was done, and Mr. Brounger, M.I.C.E., became the chief. Under him, during the recess, extensive railway schemes have been prepared, and though at present there is only one line of railway working in the colony (that being about fifty miles in length, with a short branch of about seven miles), it is believed the coming Parliament will pass extensive measures, and railways (the plans for which will be laid at once before the House) will be carried out throughout the colony.

Besides railway schemes, there will be the bridging of the Orange River, a work which is as much needed in the colony as any she contemplates, and which as yet has never been attempted, though the river has always been a *bête noir* to traffic. It is of great width and depth at times. During a late flood it rose in many parts over its banks; but even when confined to them, it was between 1,100ft. and 1,200ft. in width, and its depth at one site where a bridge had been determined upon was 57ft. in the centre. Its average current at this level was about  $4\frac{1}{2}$  miles an hour, and its surface was one mass of heavy drift, chiefly of trees and other timber, occasionally carcasses of oxen and other animals, and more than one human corpse. Separate designs for bridging this river in three or four different localities have been prepared by Mr. Sydney Stent, C.E., of the Public Works Department, and will be laid before the House. They are straight girder bridges of various designs, and carried upon stone and iron water-piers.

Telegraph extension is also being made. The "wire" has already reached to Colesberg in the Eastern Province, and is to be carried to the Diamond Fields and Free State.

The harbour works at Port Elizabeth it is hoped will be commenced upon Sir John Coode's plan. At East London they are already in progress. Public works generally have received impulse through the Responsible Government, backed up by the influx of money into the colony, caused by the discovery of diamonds, and it is our intention to give our readers information upon colonial engineering matters from time to time as such of interest may transpire there.

## YORKSHIRE ARCHITECTURAL SOCIETY.

**T**HE annual summer excursion of this Society took place on the 18th ult. The party left York by North-Eastern Railway at 8.45, and on reaching Kirbymoorside left the railway and took carriages to Welburn Hall. This mansion, which is now in ruins, is a fine specimen of Elizabethan architecture. Kirkdale Cave, a mile distant, was next visited. Professor Buckland has left ample records of his researches in this cavern, where he found bones belonging to about twenty different animals. The party next wended their way to Kirkdale Church, which is stated to contain remains of a former fabric of Saxon origin,

the most remarkable of which is a massive stone, which is inserted in the porch of the doorway. This stone is about 7ft. long and 2ft. wide, and is divided into three compartments, the centre one being the remains of a dial, while those on each side contain an inscription, the translation of which is, "Orm, the son of Gamal, bought S. Gregory's monastery, when it was all broken down and fallen, and he caused it to be made anew from the ground, to Christ and S. Gregory, in the days of Edward the King, in the days of Tosti the Earl." The translation of the line under the dial is "Hawarth made me, and Brand the minister." It was decided that according to these inscriptions the original church was erected between the years 1055 and 1065. Another very interesting feature in this church is a large stone, in a horizontal position, on the surface of which is carved a cross in the midst of beautifully-designed scrollwork. An inscription on this stone in Runic characters formerly existed, traces of which only now remain, though casts have fortunately been taken of it. This stone, which is built into the wall at the west-end of the church, is said to be the tombstone of Æthilwald, son of Oswald, King of Deira, from 651 to 660. The party next proceeded in the direction of Hold Caldron Mill, past Lily Wood, and through the hamlet of Fadmoor, to Gillamoor. The church here is modern, and contains nothing of interest to the antiquary. Having taken to the carriages again, the party proceeded to Hutton-le-Hole, and thence to Levisham, a place of great antiquity, where, about the year 650, Cedd founded the first monastery of the district. The church bears traces of its Saxon origin; it has an apsidal chancel, with three windows, which, however, have been closed to provide a space for the altar-piece by John Jackson, R.A. The painting represents Christ in the Garden. The crypt is a fine specimen of Norman work. The excursionists next proceeded to Appleton-le-Moors, where a new church, of Norman character, has been built of late years, from the designs of Mr. Pearson. The chancel is apsidal, with five windows, all richly filled with stained glass. This completed the route laid down for the excursion, and the party then returned to the King's Arms, Kirbymoorside, where dinner was served. After dinner C. F. Bolckow, Esq., M.P., W. A. White, Esq., and J. Demaine, Esq., were elected members of the society, and a visit was paid to Kirbymoorside Church, which is now undergoing extensive restoration at the hands of Sir Gilbert Scott, R.A. The party then returned to York by rail, via Philmoor and Thirsk, and so terminated the day's proceedings.

## CIVIL AND MECHANICAL ENGINEERS' SOCIETY.

**T**HE annual meeting of this Society was held on Friday last, at 7, Westminster Chambers, Mr. C. H. Rew, President, in the chair. The annual report stated that the Society was in a very satisfactory condition, the number of new members joining during the past year having more than counterbalanced the resignations. The session just terminated had been a very successful working session, and one in which the Society's influence for good had been felt in many ways. A special fund had been started for printing the papers read and the discussions thereon at the ordinary meetings. An important element in the session just closed was the course of rudimentary lectures given by two of the Society's members (Messrs. Usill and Willcocks), and the success which had attended these lectures had been so marked that it was proposed to continue them next session. The papers read at the ordinary meetings (reports of nearly all of which have appeared in the BUILDING NEWS) were fully up to the standard of those read in previous years. Visits had been made to the Holborn Viaduct Station, Chatham Dockyard, Alexandra Palace, and the Grosvenor-road Pumping Station, and other visits would be arranged for. The report, after expressing the indebtedness of the Society to the professional journals for the publicity given to the papers and discussions, concluded by stating that the Society has passed through a very useful and profitable session. The report was unanimously adopted, and the election of officers for Session 1874-75 was then proceeded with, the result being as follows:—President, Mr. G. W. Willcocks, Assoc. Inst. C.E.; Vice-presidents, W. F. Butler, Assoc. Inst. C.E., and R. M. Bancroft; Members of Council, Messrs. E. H. G.

Brewster, W. Meakin, C. Kingsford, E. Perrett, A. T. Walmisley, Assoc. Inst. C.E., J. Love, and J. A. Combs; Treasurer, Mr. W. C. Street; hon. solicitor, Mr. R. H. Willcocks, LL.B.; Auditors, Messrs. H. Valpey and W. R. Haughton; and Hon. Accountant, Mr. J. Wagstaff Blundell. Mr. E. Speed having resigned the office of Secretary it was left to the Council to fill the vacancy. Votes of thanks to the retiring officers of the Society concluded the proceedings.

## ARCHITECTURE AND CONSTRUCTION AT UNIVERSITY COLLEGE.

**L**AST week the prizes in connection with University College were awarded. The following were the successful competitors in Professor Hayter Lewis's class:—

**FINE ART.**—*Ancient Architecture.*—Donaldson Silver Medal and First Certificate, C. R. Pinke; Second Certificate, Harold A. Peto. *Medieval and Renaissance.*—Prize in Books and First Certificate, C. R. Pinke; Second Certificate, Harold A. Peto.

**CONSTRUCTION.**—*First Term.*—Donaldson Silver Medal and First Certificate, Vyvyan Trubshawe; Second Certificate, C. R. Pinke; Third Certificate, W. H. Wood. *Second Term.*—Prize in Books and First Certificate, Vyvyan Trubshawe; Second Certificate, C. R. Pinke; Third Certificate, W. H. Wood.

## COMPETITIONS.

**FARRINGTON MARKET COMPETITION.**—The premiums in this competition have been awarded as follows:—First premium ("Estelle"), Mr. Lewis H. Isaacs, £300; Second ("Wholesale and Retail"), Messrs. J. D. Mathews and Thos. Blashill, £200; Third ("Anchor"), Mr. T. E. Knightley, £100. Messrs. Butler and Deshon, Mr. Robert Walker, and Messrs. Driver and Rew, receive each one of the additional premiums of £50, for their designs, "Plan," "Westminster," and "Well Studied." Having awarded the premiums, the Court of Common Council have since determined not to build the market on the Farringdon-street site at all. At a special Court held on Monday afternoon, a petition numerously signed by salesmen and traders in Farringdon Market, praying the court at once to proceed with the construction of the market upon its present site, was presented. Mr. Isaacs proposed an amendment, the effect of which was that the new market should not be erected at all upon the present site, but upon the vacant land adjoining the Metropolitan Meat Market in Smithfield. After a long discussion the amendment of Mr. Isaacs was carried, and on the motion of Sir Benjamin Phillips it was referred to the Markets Committee to obtain plans and estimates for the erection of the new market in Smithfield instead of upon the site of the old market in Farringdon-street.

## CHIPS.

The foundation-stone of a new wing of the London Hospital, towards which the Company of Grocers has contributed £20,000, was laid on Saturday.

A new tramway through Hammersmith to Kew Bridge will be commenced in October.

A building in San Francisco that has 500 rooms is to have a clock with 500 dials, a dial for each room. The dials will be operated with compressed air, conducted in pipes all over the building. The clock has been built by the Seth Thomas Clock Company, of Thomaston, Connecticut.

The Church of St. Benedict, Cambridge, was reopened last week, after restoration, at a cost of £1,500. The south aisle and chancel have been rebuilt, and care has been taken to preserve the old tower-arch opening into the nave, which is regarded as one of the most noticeable Romanesque arches in the country.

An American journal thinks that if Miss Thompson, in her now celebrated "Roll-Call" picture, has drawn her horses' feet wrong, she is no worse than Raffaele, who represented the Disciples drawing boiled lobsters from the Sea of Galilee.

The Free Church of Braco, Perthshire, was struck by the lightning on Wednesday week and rendered a mass of ruins, the steeple falling through the roof.

On Thursday week was opened a new Congregational chapel at Blackburn. The building has cost £18,000.

Wakefield Parish Church, which has been undergoing complete restoration for some time past, will be reopened in September.



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## ILLUSTRATIONS.

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CHURCH, LONDON—BEAUVALE—PREMIATED  
DESIGN FOR FARRINGTON MARKET—CHURCH  
AT ANGICOURT—WROUGHT-IRON ENTRANCE-  
GATE—FLOATING SWIMMING-BATH, CHARING-  
CROSS—ITALIAN SCULPTURE, FIFTEENTH  
CENTURY—S. PETER'S CHURCH, EATON-  
SQUARE.

## OUR LITHOGRAPHIC ILLUSTRATIONS.

## FARRINGTON MARKETS.

THIS design, for which a £50 premium was awarded, was submitted under motto "Westminster," by Messrs. Driver and Rew, of 5, Victoria-street, S.W. The designers proposed to excavate the whole of the area of the intended market to the level of the main entrance in Farringdon-street, and to form on this level the vegetable market, approached by two entrances from Farringdon-street, by stairs from Shoe-lane, and by inclined roadways from Stonecutter-street. The fruit and flower markets were arranged on the level of Shoe-lane, and formed by galleries over the vegetable market. This market had two entrances from Shoe-lane, in addition to several means of access by stairs from Farringdon-street and the lower market. On the site of the present Stonecutter-street, a roadway of the same gradient, 32ft. wide, was proposed, connecting Farringdon-street with Shoe-lane, and serving to connect the upper and lower markets. From this roadway there were three entrances to the latter by inclined roadways, and two entrances to the former by wide flights of steps. In Shoe-lane a range of shops was proposed, the rear frontages of which are seen in the perspective view. A tavern and dining-rooms were contrived at the northern end of the market in Farringdon-street. Ample sanitary arrangements for both sexes was provided. The keeper of the market had a residence on the upper level of the building. The estimate of cost, and for which tenders were enclosed, was £104,220, and the estimated rental to be received from the various shops, stalls, &c., was £11,340 per annum. A block plan of this design was published, with several others, including that of the 1st premiated design, in the BUILDING NEWS, of March 20 last, when we reviewed the whole series of designs submitted.

## THE TEMPLE CHURCH, LONDON.

Amongst our batch of illustrations, we give a double-page sketch of Temple Church, by Mr. H. G. Gribble, architect. "Temple Church," says Mr. Gribble, "is so well known to the profession and the public, that a description of it seems altogether unnecessary; and although illustrations of it are common enough, I do not remember seeing one which shows the conical roof over the 'round,' recently added by J. P. St. Aubyn, Esq., to whom its restoration was entrusted. That such a finish was originally intended by its founders appears to me doubtful, but nevertheless it is a happy termination, though its pitch is somewhat high."

## FLOATING SWIMMING-BATHS ON THE THAMES.

Our illustration gives a view of the interior of the Charing-cross Bath, now in the course of completion, and which, when finished, will occupy one of the recesses in the Embankment, close to Hungerford Bridge. The hull, containing the bath and filtering apparatus, is built of wrought iron; the superstructure is principally of cast iron and glass. The bathing area is 135ft. by 25ft., and the depth varies from 3ft. to 7ft., commodious dressing-boxes being provided. The bath, with its extensive and complicated machinery, is the production of Mr. E. Perrett, of Abingdon-street, and Mr. C. W. Whitaker, the engineers to the Floating Swimming Baths Company, and we are assured that by the patent process of the former gentleman, clean water in great quantity (1,000 gallons per minute) can be thrown with ease into the bath. The superstructure, of which we give a perspective view, is designed by Messrs. Driver and Rew, of Victoria-street. Floating baths on

the Thames have long been looked for and longed for, but we had almost given up the hope of overcoming the difficulty of dealing with Thames water so as to render it fit to bathe in, the attempt to filter it in sufficient quantity, within the limits of any floating structure, having hitherto proved futile. If, however, the water supplied to the Charing-cross bath be similar to that produced at trials we have witnessed, we have no reason to apprehend any further difficulty from this source.

## ENTRANCE GATES.

The entrance gates illustrated this week were designed by Richard Q. Lane, of Belfast, and were awarded the highest prize (the gold medal) in the national competition last year at South Kensington. The portion shown is merely the carriage entrance; but the wickets, or side gates, are intended to be exactly similar in design, and of two bays, 4ft. wide each. The outer piers would be of the same design and material—freestone—as those shown, but finished with stone finials of a suitable character. It is intended that the whole of the framing, &c., of gate, be of the best Staffordshire iron, and all the foliage, flowers, &c., of sheet metal, wrought with the point of the hammer, cast iron being nowhere used except for bulbs. When one part crosses another, they are to be half notched, and all work not welded to be fixed on by rivets, in preference to screws. The front and back stiles, vertical bars, &c. to be ornamented by appropriate sinkings with drill and chisel.

## S. PETER'S, EATON-SQUARE.

Last year an addition was made to the east end of this church, consisting of a chancel with transepts, and an organ-chamber and two large vestries, with a strong room under the priests' vestry. At the same time additional entrances and staircases were made at the east end of north and south aisles. All these works were carried out as part of a complete scheme for remodelling the interior of the church, which was in some respects inconvenient as well as unsightly. The architect felt that any attempt to alter the exterior would be a mistake, but that the interior, consisting simply of a large square room with galleries, had so little distinctive character, that he was at liberty to adopt any style or treatment which would produce the best and most dignified effect. The general features of the complete design will be gathered from the illustration. The exterior will remain unaltered. The new works at the east end were carried out by Messrs. Waller and Son, of Lyall-street, Belgrave-square.

## DOORWAY OF ST. TROPHIME CHURCH, ARLES.

One of our double-page illustrations represents the celebrated doorway of this church, which we have reproduced from "Architecture Romaine," by Henry Revoil. We shall give two or three more specimens from the same sumptuous book in the course of a short time, when we shall have something to say about Roman Architecture in France.

## BEAUVALE, NOTTINGHAMSHIRE.

We are enabled to give a double-page illustration, and two pages of detail, of Beauvale, in Nottinghamshire, built for Lord Cowper, and designed by E. W. Godwin, F.S.A. We should like to have given, as we are in the habit of doing, a short description, in company with the illustration, but we cannot do it for pretty much the same reason that the Spanish fleet could not be seen—because it was not in sight. Mr. Godwin not having supplied us with the necessary information, we cannot supply it to our readers.

## CHURCH AT ANGICOURT.

The church at Angicourt (Oise), France, of which we give west front, side, longitudinal section, cross section, and two bays of nave, has undergone many transformations. The chancel and right transept are the most ancient portions, and date from the twelfth century; the nave was built in the early part of the following century. In the fourteenth century many modifications were effected, and the upper stages of the tower added, together with the left transept. The porch and chapels, though later additions, complete the unity of the plan.

## WOOD PAVING.

AT a meeting of the City Commissioners of Sewers on Tuesday week, the report of the Streets Committee, recommending that the undermentioned tenders for wood-paving works be accepted, was adopted, viz., S. Martin's-le-Grand, Improved Wood Pavement Company, at 15s. per yard superficial, and 1s. per yard per annum for fifteen years for maintenance after the first two years. Aldersgate-street, Improved Wood Pavement Company, at 15s. per yard superficial, and 1s. per yard per annum for fifteen years for maintenance after the first two years. King Edward-street, Improved Wood Pavement Company, 15s. per yard superficial, and 9d. per yard per annum for fifteen years for maintenance after the first two years. Angel-street, Improved Wood Pavement Company, at 15s. per yard superficial, and 9d. per yard per annum for fifteen years for maintenance after the first two years. Cannon-street, Mr. Stephen Carey, at 13s. 6d. per yard superficial, and 1s. 6d. per yard per annum for maintenance after the first two years. Fore-street, Ligno-Mineral Paving Company, at 16s. per yard superficial, and 1s. 6d. per yard per annum for fifteen years for maintenance after the first two years. In answer to a question from Mr. Innes,

Mr. HAYWOOD, the Engineer to the Commission, said that Mr. Carey had laid down his pavement in Houndsditch and Bartholomew-lane, and was for many years the sole wood pavior to the Commission. Mr. Haywood then proceeded to read a report which he had prepared and presented to the Streets Committee, stating that, in pursuance of instructions, he had opened in various places the several wood pavements at present existing in the streets of the City, for the purpose of ascertaining their exact condition as regards decay. A hole was opened in the Improved Wood Paving in King William-street, laid in August, 1872, and the wood was found to be perfectly free from decay. Another hole was opened in this paving at a spot where water was known to accumulate, but here also the wood was found to be free from decay. The surface of this pavement was in excellent condition. A hole was also opened in Mr. Stephen Carey's wood pavement in Bartholomew-lane, laid at Christmas, 1871, which was found to be sound, but the surface was inferior to that of the Improved Wood Paving. One hole was opened in the Ligno-Mineral paving in Gracechurch-street, laid in August, 1872, and the wood was found to be free from decay. The blocks of this pavement had worn round, and at certain places the surface was very uneven. The aggregate area of the thoroughfares which it was now proposed should be paved with wood was about 23,800 yards.

S. Joseph's (Roman) Catholic Church, Preston, was opened on Wednesday week. The church is 115ft. long by about 50ft. wide, and very lofty. It is built of brick, with long lancet windows. The architect is Mr. O'Byrne.

The new Church of S. John the Evangelist, South Hornsey, was consecrated on Saturday. It is just opposite Finsbury Park, and has been erected from the designs of Mr. F. Waller.

The memorial-stone of a new temperance hall was laid in Penzance on Wednesday week, by C. C. Ross, Esq., Banker. Messrs. J. Trounson and Son are the architects.

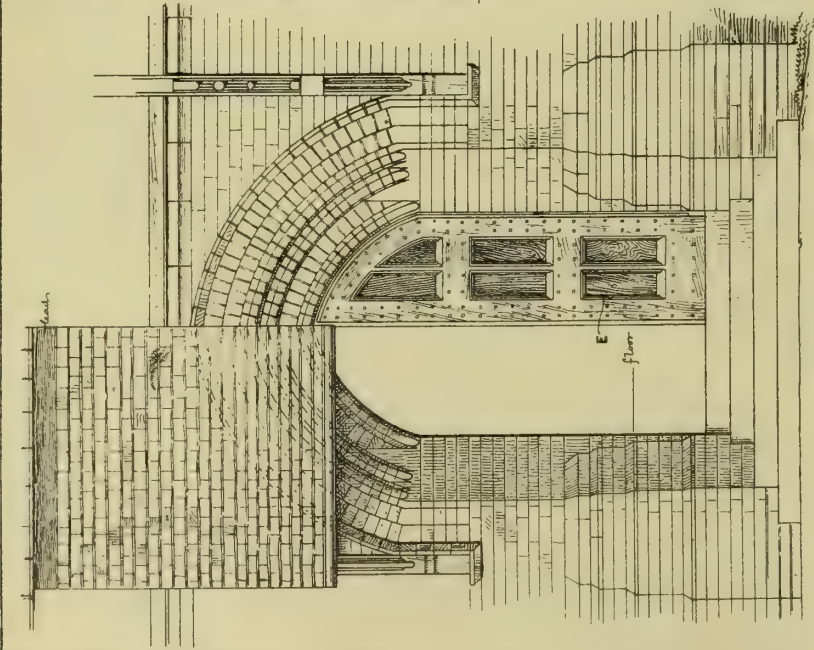






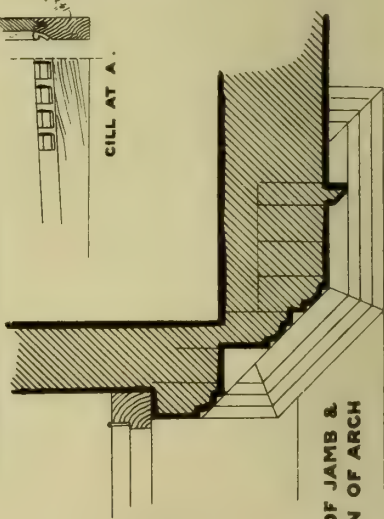
**BEAUVALE THE RESIDENCE OF LORD COWPER.**

**VARIOUS DETAILS.**

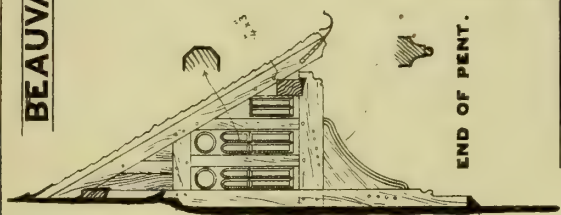


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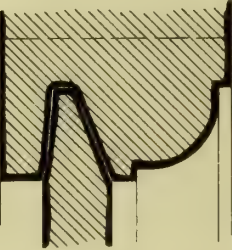
ENTRANCE DOORWAY.



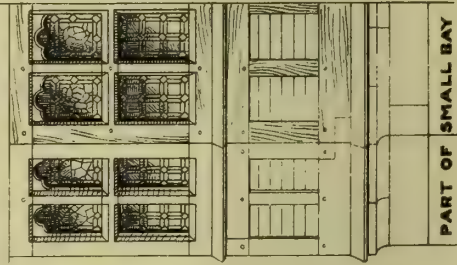
PLAN OF JAMB & SECTION OF ARCH



END OF PENT.



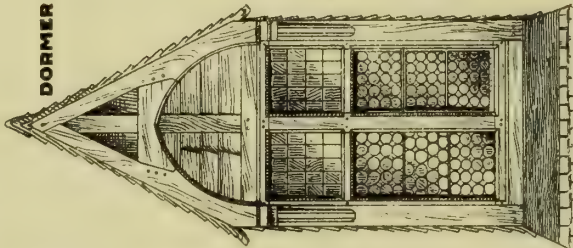
MOULDING TO PANELS E.



PART OF SMALL BAY

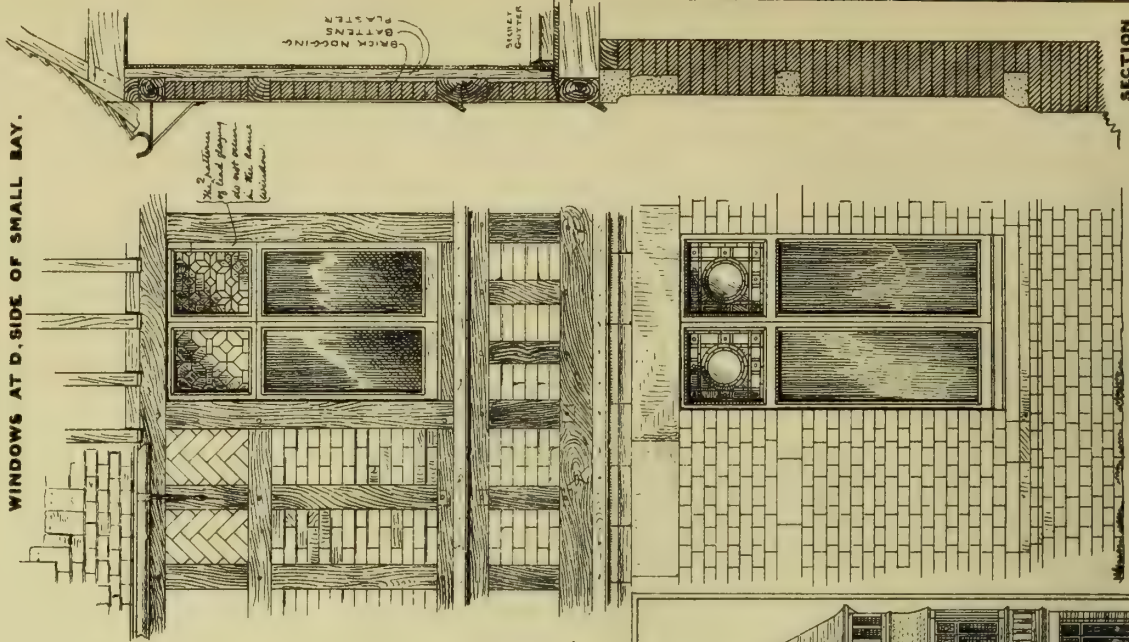


SECTION.



DORMER B.

WINDOWS AT D. SIDE OF SMALL BAY.



ELEVATION

SECTION

EDWARD W. CODWIN J.S.A.  
ARCHITECT

SCALE OF FEET

15

20 feet.

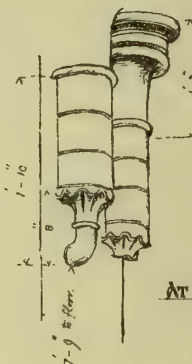
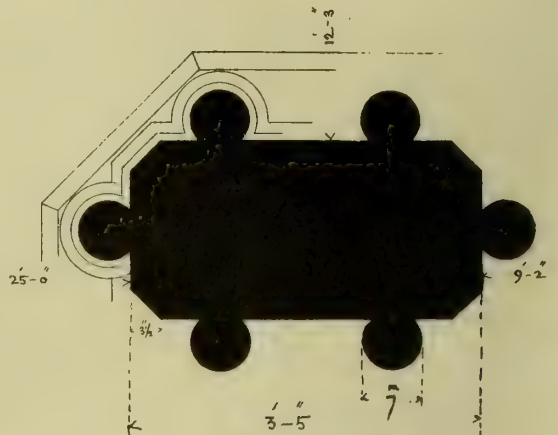
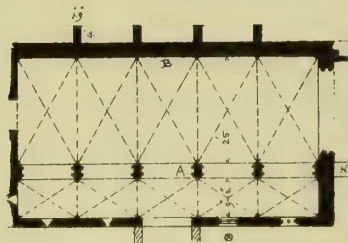




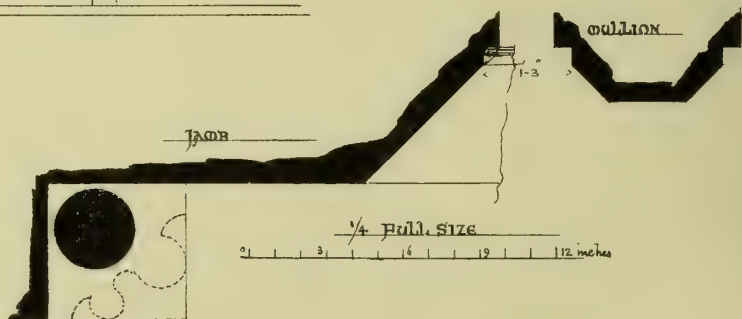
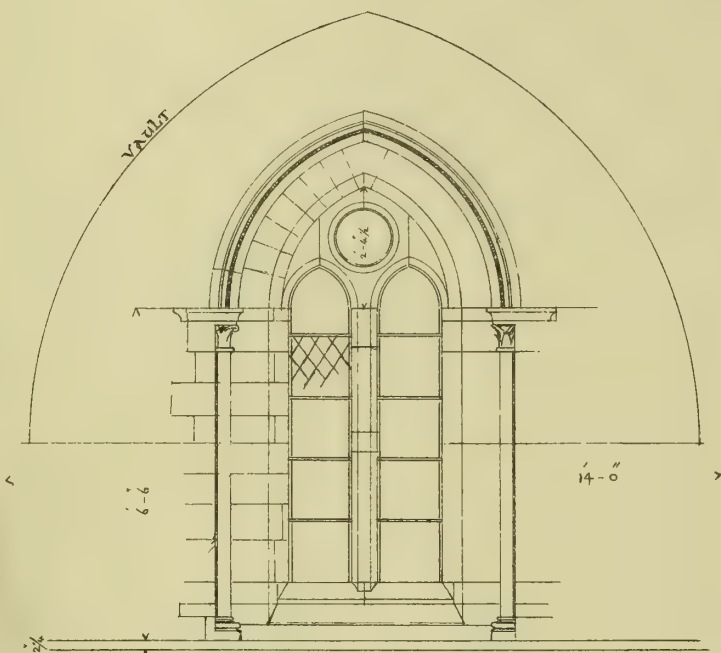


# ST GILLES NEAR ST LÔ

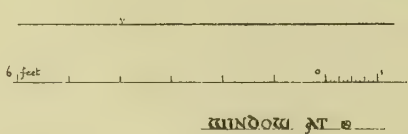
Measured & drawn by E.W. Lyster.



AT A



1/4 full size  
2 1 3 1 5 1 2 1 12 inches







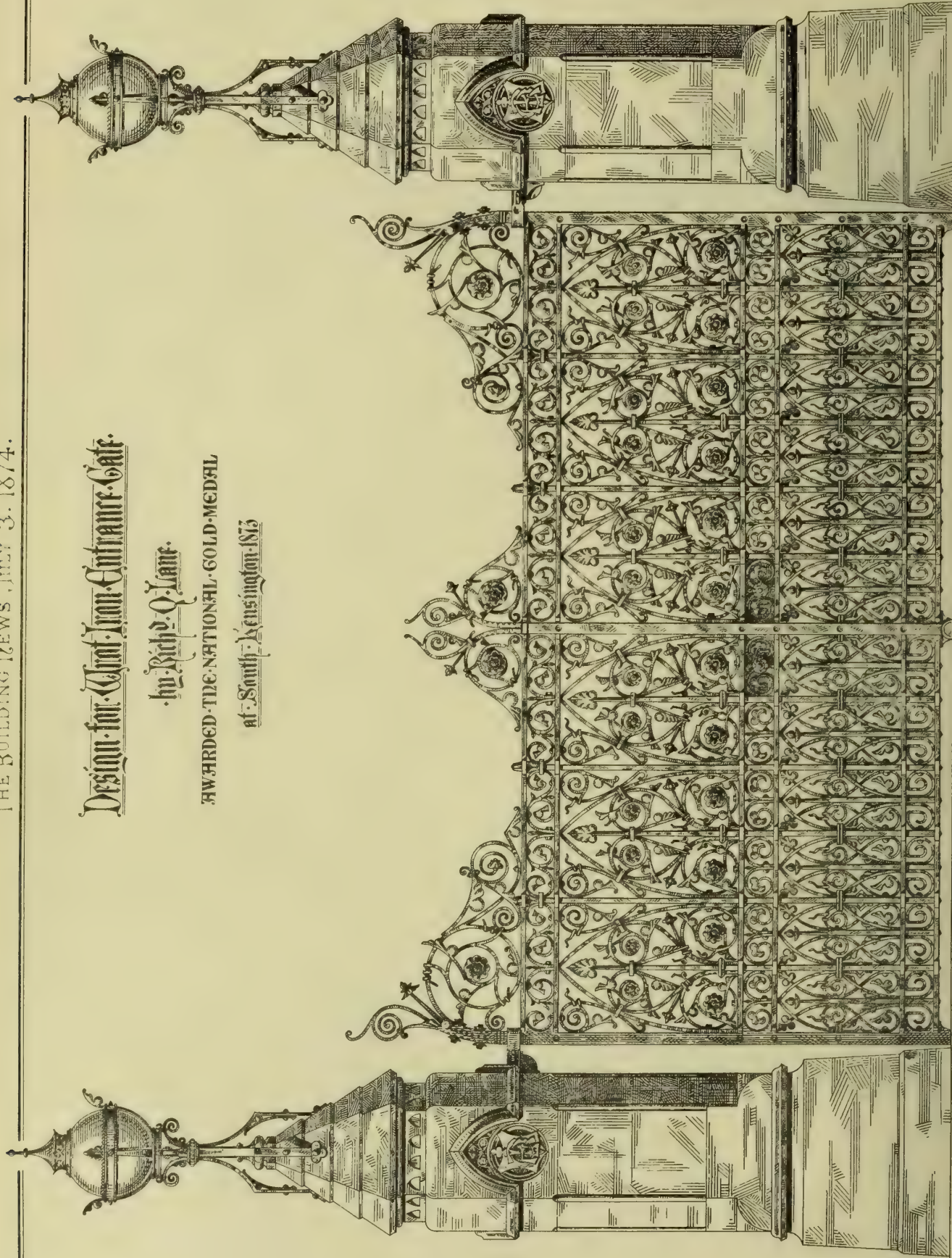


*Design for Great Iron Entrance Gate.*

*by Richd. O. Lane.*

AWARDED THE NATIONAL GOLD-MEDAL

at South Kensington 1873

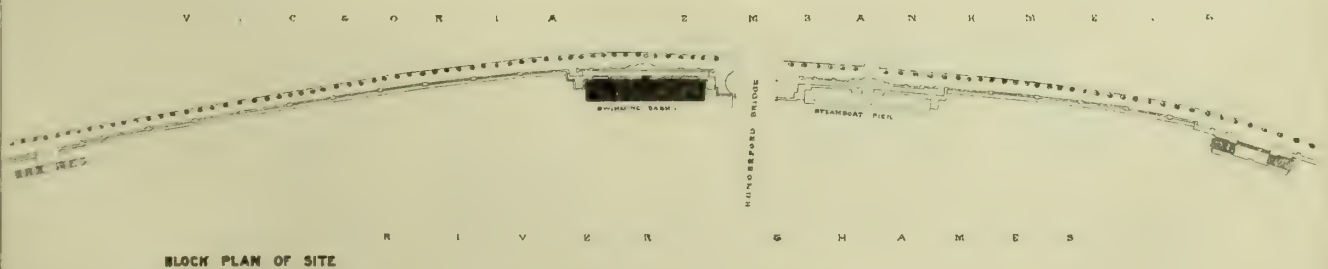


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FLOATING SWIMMING BATHS CO. (LIMITED) CHARING CROSS BATH.



BLOCK PLAN OF SITE

WHITAKER & PERRETT, ENGINEERS







S. PETER'S CHURCH

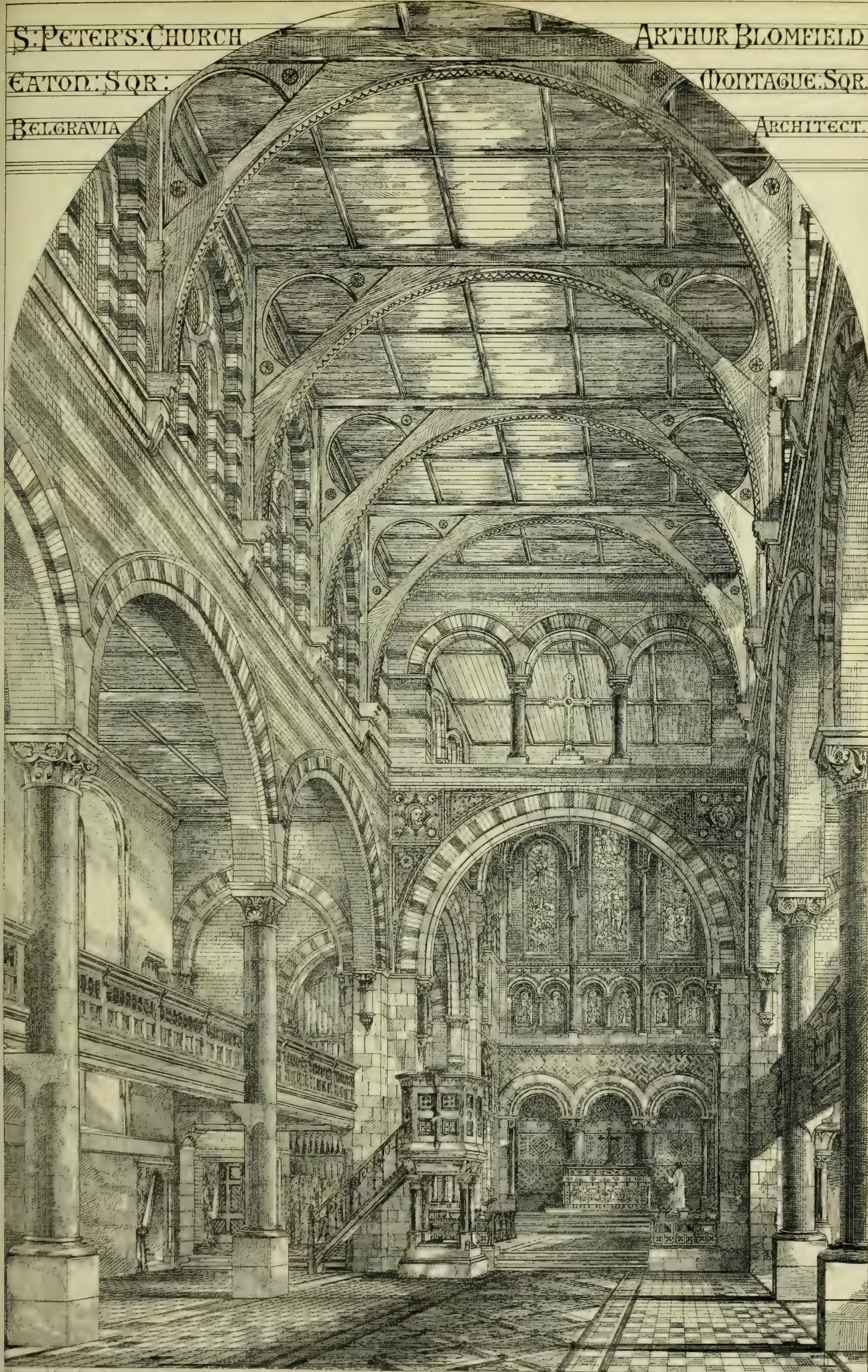
ARTHUR BLOMFIELD

EATON. SQR.

MONTAGUE. SQR.

BELGRAVIA

ARCHITECT.

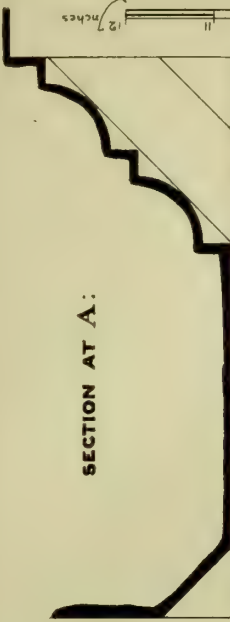
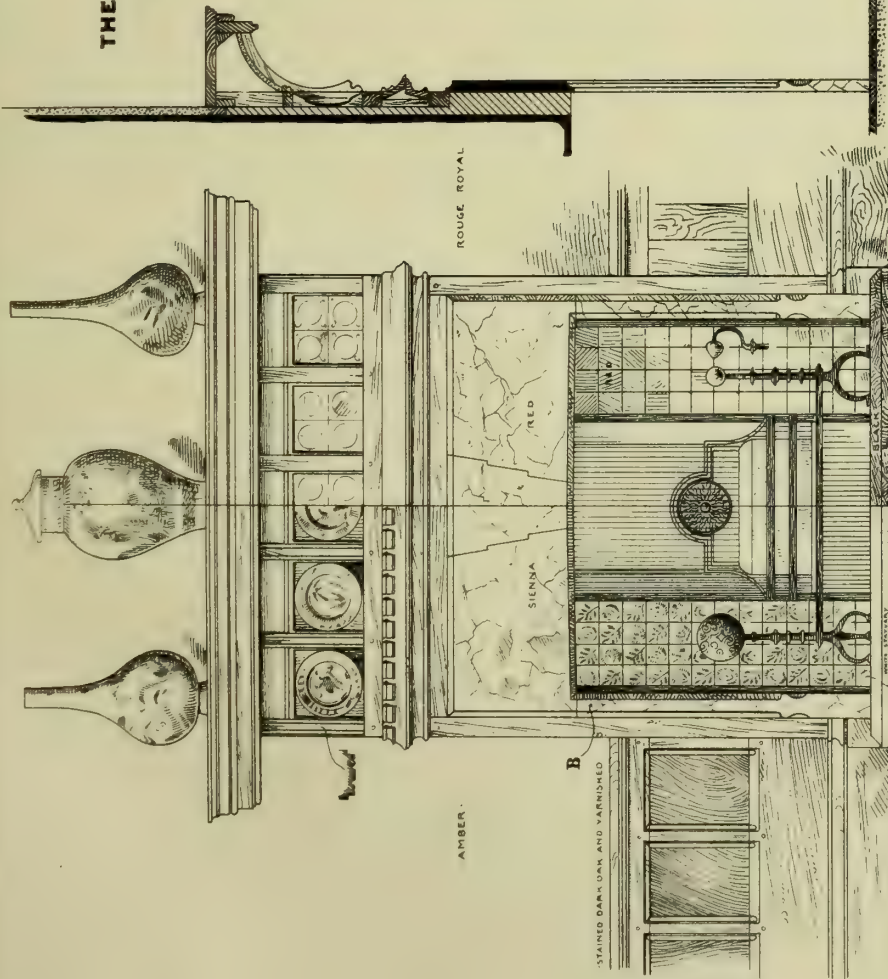




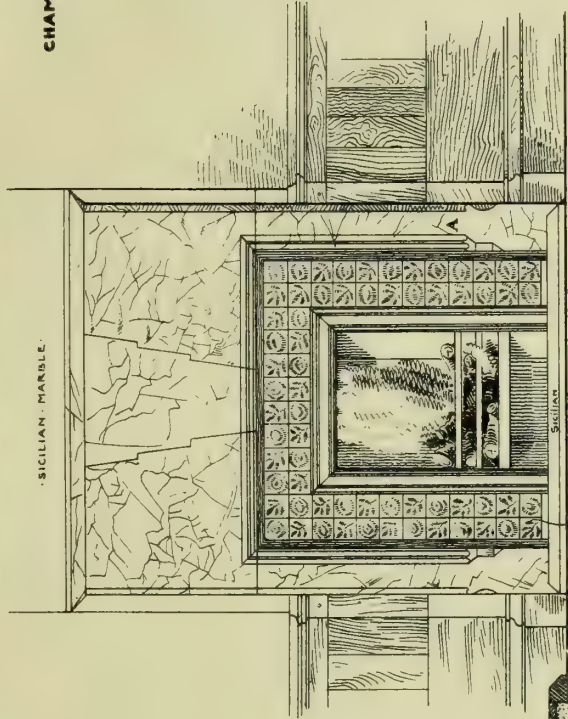




BEAUVALE  
THE RESIDENCE OF LORD COWPER.  
DETAILS OF FIREPLACES  
AND OF  
MANTLES.



HALL, BUSINESS ROOM & SMOKING RM.



CHAMFER AT B:



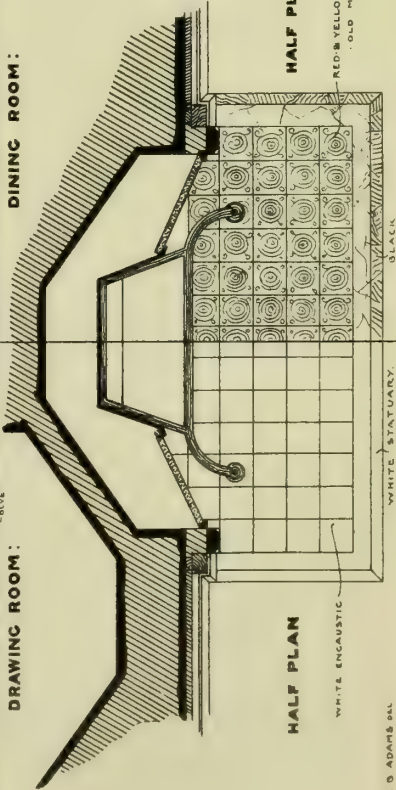
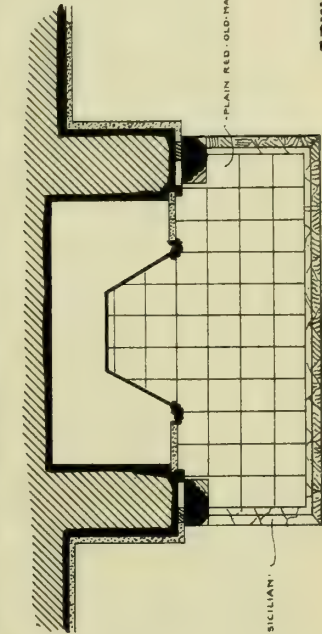
Nº 1 - SCALE OF FEET TO GENERAL DRAWINGS  
Nº 2 - SCALE OF ONE FOOT TO DETAILS

SCALES

DINING ROOM:

DRAWING ROOM:

SECTION



NOTE  
'ALL TILES ARE HIGHLY  
GLAZED HEARTH TILES'

HALF PLAN

HALF PLAN

RED & YELLOW ENCAUSTIC  
OLD MARBLE

WHITE ENCAUSTIC

WHITE STATUARY

MAURICE D. ADAMS DEL.

EDWARD W. CODWIN F.S.A.  
ARCHITECT.

PLAN.







## THE "QUEEN ANNE" STYLE—THE REACTION OF TASTE.

ALTHOUGH Mr. Stevenson's paper, read at the Institute, showed in what direction the current of taste is flowing, it failed to take into account the main causes which have been at work in effecting the reaction of which he spoke. As to the question of the reaction itself, like all reactions from an idea which has had its run, there can be little doubt. Styles, like fashions, come and go, and the very pioneers and staunchest supporters of Gothic have been unwittingly hastening on the change, which is now creating a little alarm and giving anxiety to the most devoted disciples of Mediævalism. But the immediate causes of this change are perhaps not so apparent. One of the greatest has been the tendency of a certain school of Mediævalists to revive the "feeling" and spirit, as it has been called, of the middle ages, not content with giving us the generalised principles and features of the style. For example, in many of our recent buildings have been placed before us stone carving and details of the crudest and most grotesque sort, the repetition of forms and details of the old Gothic masons, without the remotest conception of the meaning and conceptive spirit of the original works. Now this has been a source of fruitful error of the school we allude to, and which we will call the Gothicsque. Again, in wood work, in metal work, and in painted glass, the same desire to exhibit the letter of Mediæval art, under the idea that its spirit also is embodied, has been instrumental in aiding the movement, by presenting to the public mind a contrast too great between such art and our modern wants and tastes, besides its inadequacy to meet the demands of the age. We refer more especially to Gothic joinery, as sought to be adapted to our houses and public buildings. What can be more out of place than some of the traceried heads and small turned shafts, violating the natural grain and fibre of the material? But one of the greatest helps the Gothacists have given to the present movement is the want of discrimination they have shown, as well as their persistency, if not obstinacy, in totally ignoring all other forms of art but their own. As Mr. Stevenson showed, they have urged the style was good for everything. Gin-palaces, speculative tenements, semi-detached villas, factories, have all been Gothacised, and this "facile adaptation" "has lent itself to the expression of loudness, vulgarity, obtrusiveness, and sensationalism more objectionable than the dreariest Classic of Gower or Wimpole-street; the one may be dreary prose, the other is screeching sensational poetry." So long as the style was confined to ecclesiastical buildings, there was a logical distinction apparent. Time-honoured traditions, and the examples left us of innumerable churches scattered in the country, gave a sort of prerogative to Gothic as an ecclesiastical art. Not so, however, when we turn to secular and civic structures. We had few or no examples of these in our own land, and to try and adapt the style to them was giving a larger dose of the specific than the national taste was capable of relishing. It was overdoing the subject with a vengeance. These are the main powers which have helped forward a change in the national taste, or rather we would say induced a feeling of aversion for a style so thoroughly forced as it has been by a particular section. Art must own a grander law than herself. It is a narrow idea to suppose that artists must dictate the movement of public taste, or arrest its progress just as they please; that there is nothing higher at work than their own preferences. Such however appears to be the supposition. The Gothacist and Classicist each thinks the public taste should be bound and regulated by his standard, that everything should be Gothic or Classic, or nothing. But all they do tends to create a reaction; the very persistence and enthusiasm they manifest is only hastening forward an opposite impulse—a contrary taste, as we have elsewhere shown. The primitive impulse

of the movement must, then, be looked for beyond the confines of art and its professors, which latter may be regarded as secondary agents. But what is the threatened reaction in architecture of which Mr. Stevenson speaks? It is that called the "Queen Anne" style—in truth, a return to a less restrained and freer kind of Classic than we have hitherto had under the Revival. Now, whether this reaction be called "Queen Anne," "Free-Classic," or "Re-renaissance," or by any other designation, the reaction is certainly setting in, and will be found to indicate a *via media* between the severity of Greco-Classicism and the vagaries of the ultra-Gothic movement. In some recent observations we made in these pages we have shown the *rationale* of this.\* In both the pseudo-Classicism of the last century and the Mediævalism which is now so rampant we have overshot the mark, and it is only reasonable to expect the next tentative movement will be equally removed from both these extremes. We differ from Professor Kerr in the remark that this change is only a passing one to a *purser Classic*, if by that he means a retrograde step. We think, rather, it will lead to something far more pliant than any kind of previous Renaissance—to something in which the new activities, materials, and science of the age will play an important part. But we do not think, with Mr. Stevenson, that the "Queen Anne" style is the fair representative type of this change. While it may be willingly seized by the Gothic school of architects in their reluctant abandonment of all they prize, we think some of its forms are too capricious to entitle it to claim the next reflex of the national taste, and that its present apparent title to popularity has a far too limited basis for such a conclusion. The instances adduced by Mr. Stevenson are insufficient. Sir Digby Wyatt's house at Kensington, and some of the other representative buildings of the style, certainly show one or two features that are improvements upon the crude and grotesque attempts to make our Gothic sufficiently *en courant* with the age. Take windows; how few really good adaptations we have suitable for business premises. The vertical connection of windows by projecting dressings is a good feature of the proposed style; yet in other features it introduces some very questionable details, e.g., heavily decorated pediments, entablatures, spurious orders, and grotesque ornaments of a kind equally objectionable with some Gothic vagaries of the present day.

Mr. Edmund Sharpe admitted his surprise at such an architectural reaction as this. It is a sore blow to the Gothic party. Though Mr. Sharpe claimed for Gothic a deeper regard than an architect's movement, his arguments failed to show any evidence of its future development which he prognosticated. He said the second half of this century will give a greater impetus to Gothic, though by what reasoning he arrives at this conclusion is not told us. That the Gothacists have overshot the mark in departing from early types of our own country we readily admit, and also that they have aimed at an exuberance, and that no works of our leading architects fairly realise the true spirit of Gothic. While Mr. Sharpe admits this—and it is an important admission from one of the closest observers of the party and one of its most devoted students—he still vainly hopes. But how, we ask, is the study of detail, which is recommended, and the feeling of a past age to be learnt? Perhaps Mr. Sharpe will enlighten us upon this metaphysical problem. Go back we cannot; it is as utterly impossible as it would be to roll back the tide or return to childhood. No classification of English architecture, however elaborate, will do it, any more than the classifier of zoology, botany, or conchology can give us the feeling and life of extinct species of animal, plant, or shell. But Mr. Sharpe has enough faith in his creed to assert that such a change of taste is as impossible as that Mrs. Partington can mop up the Atlantic.

Mr. Waterhouse, with equal *naïveté*, thought

\* "The Current of Architectural Tastes," p. 412, April 17, last.

that architects had only just begun to understand and apply Gothic, and that it would be a hard thing for it to be supplanted just now; and we believe that if the Gothic architects could be polled, they would think such a crisis beyond probability. Time fights on the side of change, however, and Mediævalists themselves are helping the movement on with a power more potent than that wielded by the strictest Classicist. Our own pages have borne witness to the extent to which a set of enthusiasts will go. Only a week or two ago a correspondent, in a telling letter, questioned the propriety and good taste of sketching round a tomb figures of chanting monks, and, in fact, bringing before us on every occasion Mediæval accompaniments and "exploded mummeries," even to the illustration of modern works. Again, we find correspondents asking such questions as "whether an archbishop should hold a cross or a crozier," as if such accessories or points of nicety were of essential value architecturally. Such, then, are the means the ultra-Mediævalist is unconsciously using against himself by provoking thought which he dreams does not exist at all, because it does not exist for him. No one more than ourselves can admire the excellences of the Gothic style or the spirit under which our great Mediæval builders thought out their noble masterpieces at Salisbury, Lincoln, and Amiens. They were noble, because they were the natural expressions of the age, but our work cannot claim this nobility unless we take them simply as germs of what the style is capable, and we believe it is in this spirit our most able Gothic architects are working. G. H. G.

## PARLIAMENTARY NOTES.

THE LIGHT IN THE CLOCK TOWER.—Mr. Torrens on Thursday week asked the First Commissioner of Works whether the Government intended to act on the report of the engineer of Trinity House as to competition by trial of the electric and gas lights on the Clock Tower, in which report the superior advantages of the former, as regarded intensity and cost of illuminating power, were fully stated.—Lord H. Lennox said the question had been discussed in the House, and he had said before that it should be left to hon. members to say whether the light should be made permanent or not. He understood that the general feeling of the House was in favour of retaining it permanently, and during the recess he would consider which description of light should be permanently adopted.

THE WELLINGTON MONUMENT.—On the order for going into Committee of Supply, Mr. Goldsmid called the attention of the House to the contract made two years ago with Mr. Collman, the upholsterer, for the completion of the Wellington Monument, and asked the First Commissioner of Works why the monument was not yet completed.—Lord Henry Lennox said since his advent to office considerable progress had been made with the work, and the recumbent figure of the Duke was now nearly finished, as also were the side groups. The work done was of the most superior description, and on the whole he thought it highly desirable that the matter should be left in the hands of Mr. Stevens, the artist engaged upon it.—Mr. Lowe rebuked Mr. Goldsmid for describing Mr. Collman as "the upholsterer," declaring that there was nothing disgraceful in following such an occupation, and pointed out that Mr. Collman had entered upon the work with a desire to benefit the nation. After a few words from Sir G. Balfour, the subject dropped.

THE BRITISH MUSEUM.—The House having gone into supply, an interesting discussion took place on the vote for the British Museum. Sir W. V. Harcourt suggested that, with a view to render the Museum more valuable to the public, lectures illustrative of the treasures exhibited should be established, and this, he estimated, could be done at an expenditure not exceeding £1,000 a year.—Sir J. Lubbock pointed out difficulties. Several hon. members urged the claims of the officers of the British Museum to an increase of salary.—Mr. Beresford Hope contended that if this country desired to maintain its museums on the level of those in Paris and Vienna, it must face the price which literary labour commanded in the markets of the world.—Mr. Walpole replied on behalf of the trustees of the British Museum.



He submitted that that House was not the place to decide the question of what salaries should be allowed to the officers; but he explained at length what had passed respecting this subject. The Trustees had recommended a general rise in the scale of salaries, but the late Government declined to accede to that suggestion. The Trustees had proposed that the salaries of the junior class of assistants and of certain of the keepers should be increased, and that had been sanctioned by the Treasury. The right hon. gentleman assured the House that neither the Trustees nor the present Government desired to keep down the salaries of the officers of the museum, and it might be necessary to reconsider the cases of the officers whose salaries had not been raised. Mr. Walpole added that until the National History Exhibition at South Kensington was completed, there would not be proper accommodation for the exhibition of some of the collections. As to the lectures suggested by Sir W. V. Harcourt, he said there was not accommodation for them at the British Museum, but that in the New Natural History Museum at South Kensington it was arranged that lectures should be delivered. After some further conversation, the vote was passed.

**THE FRESCOES IN THE HOUSE OF LORDS.**—Mr. Hankey asked the First Commissioner of Works if there was any reason why the eight frescoes in the passage leading to the House of Lords should not be covered with glass in the same way as the eight frescoes in the corresponding passage leading to the House of Commons, by which glazing the latter frescoes appeared to have been considerably preserved. Lord Henry Lennox said it had been determined to cover the frescoes with glass, but before that was done they would have to be touched up where they were defaced.

**THE METROPOLITAN BUILDINGS BILL.**—On Wednesday the Committee of the House of Commons passed a series of important resolutions as to the merits of the bill, the main features of which consist of limiting the height of buildings to 65ft., restricting the cubical contents of manufactories and warehouses to 300,000ft., and also altering the position and status of the district surveyors. The chairman (Sir Seymour Fitzgerald) stated that the Committee had resolved, first, that it was not desirable to fix any limit as to the height of buildings in new streets above 50ft. wide; secondly, that it was not desirable to fix any limits as to cubical contents in buildings other than warehouses; thirdly, that where a building is used partly as a store for goods and partly as a shop for selling goods by retail, the portion used for storing goods should be regarded as a warehouse and be subject to the limitations as to cubical contents provided in the bill; fourthly, that with regard to district surveyors, their status should remain the same as under the former acts of Parliament, the power of appointment, suspension, or dismissal resting with the Metropolitan Board of Works, but that the Board shall have power to institute proceedings before a magistrate in regard to any question of dispute arising between a district surveyor and a builder or owner of property, or in regard to any matter connected with the discharge of the duties of the district surveyor in regard to which they think the public interest is involved; fifthly, that the district surveyor or the Metropolitan Board shall have full power to stop the progress of any building in which the material or construction is calculated to be dangerous or injurious to health, and to summon the builder or owner before the magistrates. The committee also recommended, in reference to the schedules of the bill, that they be incorporated into the bill itself, instead of being carried out under bye-laws. The chairman then remarked that, as the promoters would no doubt require time to take into consideration the resolutions which he had read, the committee proposed to adjourn the proceedings until Tuesday next.

#### ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETIES.

**BIRMINGHAM MIDLAND INSTITUTE.**—The first of the afternoon walking excursions of the Archæological section was made on Saturday afternoon, when about thirty-five members left Birmingham for Salford Priors. The first place visited was Salford Priors Church, which within the last twelve months came under the hands of the "restorer," and has suffered as many other restored churches have. The chancel has been scraped and pointed and defaced by an ugly

reredos and cornice. The tower is still untouched; fifteenth-century builders availed themselves of the work of their predecessors; the twelfth century base having been extended laterally to support the later superstructure. The other portions of the church which have been chiefly worth study are the curious octagon turret, with its grotesque gargoyles, on the south side of the church; the large rectangular Norman piers, dividing the nave from the south aisle; and the Flamboyant window on the north side of the nave. From thence the party strolled through the meadows by the Avon to Cleeve Prior, a village with a not uninteresting church, with a thirteenth-century nave and fourteenth-century chancel, showing some traces of earlier work. The church appears to have been originally transeptal, the sight of the south transept being occupied by an unsightly churchwarden structure. There are good lowside windows in the chancel. From Cleeve, another walk brought the members to Middle Littleton, where a stay was made to inspect the stately fourteenth-century barn, and the fine manor house, of the sixteenth or seventeenth century. The church here appears to have been an interesting example of the thirteenth century, but it, too, has been restored, and has now but few charms for the archæologist. At South Littleton the members found a good Queen Anne house, which has been built up against one of the gabled houses common to the district, and also an unrestored thirteenth-century church.

**DISCOVERY OF EPISCOPAL RINGS AT DURHAM CATHEDRAL.**—Two very valuable episcopal rings have been found, but either on account of the disturbances that have taken place, or in consequence of the removal of the slabs, it is difficult to say in whose graves they were. It is believed that they must have belonged to Bishops William de S. Barbare (1152), Hugh Pudsey (1194), or Philip de Pictavia (1208). The tombs of two of the bishops have been found, together with the coffins, which were cut out of solid stone, with a rest for the head at the west end. Among the rubbish about the tombs was found, especially in those of Bishops S. Barbare and Pudsey, a quantity of gold, being portions of the vestments in which they were buried. This was found throughout the whole of the coffin, except at the feet. On the right side of both the graves, where the hands would be, were found two very massive gold rings. One of them is very massive, weighing about an ounce. It is plainly set, the stone being a pale-coloured sapphire. The second ring is not so massive as the former, but it is of similar manufacture, the stone being also similar. The remains of a chalice, much oxidised, have also been found.

**LINCOLNSHIRE ARCHITECTURAL ASSOCIATION.**—The Lincoln Diocesan Architectural Association met at Mansfield on Tuesday week, that town having been selected by the Society as the place for holding its meetings for 1874. At half-past ten o'clock the company left in breaks and carriages, and proceeded through Pleasley Vale, Mansfield, Woodhouse, Scarcliffe, Bolsover, Ault Hucknall, Hardwick, and Teversall. In the evening at eight o'clock a meeting was held at the Town Hall. The Bishop of Lincoln presided, and there was a large attendance.

#### CHIPS.

A new Congregational chapel was opened on Wednesday week at Hornsea, Yorks. The style is Early Gothic. Mr. Samuel Musgrave, of Hull, is the architect.

At Ivybridge, Devon, Messrs. Blatchford and Son, builders, of Tavistock, are erecting a chapel, from plans by Mr. Hine, architect, Plymouth, Cost £4,000.

The employés of Messrs. Boyd and Blandford, of New Bond-street, celebrated their annual banquet at Drew's Lullington Castle, Birchwood Corner, Kent, on Saturday last.

On Tuesday, the foundation-stone of a new temperance hall was laid at the Lye, Birmingham. Mr. Gething is the architect, and Mr. Guest the builder. The hall will be 60ft. long, 33ft. wide, and 21ft. high, and is intended to accommodate 600 persons. The building is to be of red brick, with facings of Bath stone, and the cost will be between £600 and £700.

At the monthly meeting of the Hanley Town Council on Monday week, a resolution was carried raising the salary of Mr. Joseph Lobley, the Borough Surveyor, to £265 during the ensuing year, and £300 thereafter. The communication of the resolution to Mr. Lobley was accompanied by some very complimentary remarks from the Mayor.

## Building Intelligence.

### CHURCHES AND CHAPELS.

**BENINGTON.**—The church of All Saints, Benington, Lincolnshire, has been reopened, after restoration by Mr. J. Fowler, architect, of Louth, at a cost of £1,850. The church, from its great size, may almost be called a cathedral among parish churches, its total internal length being about 144ft. Founded in Norman times, it was enlarged and improved in the thirteenth century, again altered and new aisles built in the fourteenth, and finally improved early in the fifteenth century, the fine clerestory and tower belonging to this period. The whole of the interior has been cleared of pews, west gallery, &c., re-seated with open benches in deal and newly floored with tiles throughout. The walls have been cleansed of plaster, and pointed, all the masonry restored, and one bay of the nave roof has been entirely renewed. The fine Decorated porch has been partly rebuilt and re-roofed with oak. The chancel low and flat roof has given place to an open-timbered one of the original pitch. The contractors were Messrs. White & Wood, of Alford.

**BRISTOL.**—On Tuesday the new Church of Our Lady, Tyndall's Park, Bristol, was consecrated. Only two-thirds of the building is at present completed. Mr. J. P. St. Aubyn is the architect. Ultimately the church will comprise the following dimensions:—A chancel 39ft. long, 24ft. wide, and 58ft. high to the apex of roof. North and south transepts, each 21ft. 6in. long by 18ft. wide, project from the chancel, into which they open by arches. The chancel arch is 22ft. wide and 35ft. high. The nave will be 84ft. long and 26ft. wide, with an arcade of four bold arches, 22ft. high and 20ft. wide, on each side, springing from circular shafts, with moulded bases and enriched caps. The entire height of the nave is 40ft., and to the apex of the roof 64ft. On each side of the nave are lean-to aisles of equal length, and 12ft. wide. The steeple which will be built will occupy the north-west angle of the church, and will stand 200ft. high. Advantage has been taken of the sharp fall in the ground on the south side to construct vaulted vestries and large meeting-room (56ft. by 40ft.) under the church, access being obtained to the church by a flight of steps 5ft. in width. The total estimated cost of the church was £11,000, and up to the present time about £8,600 has been expended.

**CHURCH EXTENSION.**—The Incorporated Society for Promoting the Enlargement, Building, and Repairing of Churches and Chapels held its usual monthly meeting (the last but one for the present session) on Monday week, at the Society's house, 7, Whitehall, S.W., H. Gerard Hoare, Esq., treasurer, in the chair. Grants of money were made in aid of the following objects, viz.:—Building new churches at Biggleswade, Beds.; Camberwell, S. Philip, Surrey; Great Malvern, Christ Church; Middlesborough, All Saints; Stoke Newington (All Saints), Middlesex; and Thorne's Lane, near Wakefield, York. Rebuilding the Church of East Teignmouth, Devon; enlarging or otherwise increasing the accommodation in the churches at Bromley-by-Bow, Middlesex; S. Burian, near Penzance; S. Goran, near S. Austell, Cornwall; Kimbolton, near Leominster; March, S. Windreda, Cambridge; Meavy, Devon; Merton, Devon; Outwood, near Redhill, Surrey; Owlpen, near Dursley, Gloucester; Great Plumstead, near Norwich; Earl Stonham, Suffolk; Stetham, near Ely; and Whitechapel, S. Mark's, Middlesex. Grants were also made from the School-Church and Mission-House Fund towards building school or mission churches at Bucton, in the parish of Bucknell, Salop; Cocker Brook, in the parish of Oswaldtwistle, Lancaster; Newton, in the parish of Field Broughton, Lancaster; and Northumberland Heath, in the parish of Erith, Kent. The Society likewise accepted the trust of a sum of money as a repair fund for Marston Church, Great Badworth, Cheshire.

**ELY CATHEDRAL.**—The completion of the lantern and octagon—a work which has long been deferred on account of its costliness, and because other parts of the building needed previous attention—is now in hand. At the S. Etheldreda Festival, in October, notice was taken of the lamentable condition of the lantern and the groined roof of the octagon. The Dean and Chapter have opened a new restoration fund, and



have resolved to commence the present work; and their surveyor and architect (Mr. R. R. Rowe, C.E., of Cambridge) has completed some gigantic scaffolding necessary for the purpose. The ornamentation has been placed in the hands of Mr. Gambier Parry. Of the old painting work there is next to nothing left by which to be guided. A few panels of the groining are covered with a kind of sham Gothic tracery in green and buff, but of any work of Mediæval painting in the lantern there is absolutely nothing. The treatment, both in the octagon and lantern, will therefore be new throughout.

**FOLKESTONE.**—A new aisle, recently added on the south side of the old parish-church, as a memorial to the celebrated Dr. Harvey, was opened with a public ceremony on Thursday in last week. It is designed in the style of the latter part of the fourteenth century, with rich tracery-headed windows and a handsome moulded open-timber roof. The windows are at present filled in temporarily with sheet glass, it being intended to glaze with rich stained glass as soon as funds admit of the expenditure; the roof also and the walls are to be decorated in polychrome. The works have been executed by Mr. W. H. Holdom, from the designs and under the inspection of Mr. Slingsby Stallwood, A.R.I.B.A., architect, of Folkestone.

**HIGHER ARDWICK.**—The foundation-stone of a new Primitive Methodist Chapel and Schools was laid on Monday week at Higher Ardwick, Manchester. The new buildings will be from the designs of Mr. William Dawes, architect, of Manchester. The style is Decorated Gothic. The chapel will have a tower and spire about 120ft. high and 12ft. square internally. The chapel internally will be 39ft. 3in. wide, and 63ft. 9in. long. The transepts will be 21ft. 6in. wide, and the total width of the chapel, measured between the end walls of the transepts, will be 59ft. 6in. The organ-chamber, or apse, will be semicircular on plan, with an internal width of 24ft. There will be a general vestry underneath. The minister's vestry will be 12ft. 9in. by 10ft. 3in. The library adjoining will be 12ft. 9in. by 10ft. 9in. and the store closet 8ft. by 3ft. 6in. The chapel will be 46ft. 3in. high from the floor to the highest point of the ceiling. The schools will be two stories high. Adjoining the school buildings will be a minister's house, two stories in height. It is intended to face the walls of chapel, schools, and house with parpoint stone, finished with tooled Manley stone dressings. Messrs. Robert Neill and Sons are the contractors. The entire cost is estimated at £7,000.

**RAMSBOTTOM.**—The corner-stones of the new Jerusalem Church, Ramsbottom-lane, were laid on Saturday week. The style is Gothic of Early English character, the walls being faced with Homcliffe parpoints, with dressings of Fletcher-bank stone. The length internally is 62ft. by 29ft. 6in., the height being 20ft. to wall-plates, and 44ft. from floor to ridge. The roof is to be in one span, open-timbered, and of pitch pine, and the pewing, pulpit, and all the internal woodwork is of selected pitch pine, varnished. There will be a small gallery over the entrance. Underneath the church will be a large schoolroom. Seats are provided for 415 persons. The architect is Mr. C. W. Whittenbury (Bird and Whittenbury), Manchester, and the work is to be carried out, at a total cost of £2,650, by local tradesmen.

**ROWNER, HANTS.**—The ancient and historical little church at Rowner, near Fareham, Hants., was reopened by the Bishop of Guildford on 24th ultimo, after being altered and thoroughly restored. Rowner is mentioned in Domesday Book, and we are also informed that adjoining the chapel was a small nunnery, perhaps the ap-panage of some contiguous abbey, very likely Quarr. Rowner has been in the Brun family since the 15th year of Edward I., when the king gave the manors of Fordingbridge and Rovenore, and the advowson of the church, to William le Brun. A letter is extant, dated 14th September, 1559, from a Sir John Brun to Sir William Cecil, in which Sir John mentions that he will have a tomb erected. From this we infer that the family once resided at Rowner, for the tomb in question, bearing the date 1559, is in the church, and has been restored in the most complete manner. Mr. Frank E. Thicke, of 5, Great Queen-street, Westminster, was the architect, and was highly complimented by the Bishop for the manner in which he did his work.

## BUILDING.

**RAMSBOTTOM.**—The Ramsbottom Industrial and Provident Society have commenced the erection of a new Co-operative Hall to seat 800 persons, together with increased cellars and butchers' and grocers' shops. The architects are Messrs. Bird and Whittenbury, of Manchester, the principal contractors being Messrs. James Garnett and Robert Crowshaw, joiners and slaters' work; Mr. Schofield, plumber, glazier, &c.; and Mr. Rothwell, painter. The total cost will be £4,300.

## TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.  
Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

## ADVERTISEMENT CHARGES.

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**MIDDLERBRO** (We do not know of any such book, and think you must have mentioned the wrong name).—J. J. S.—(You had better get some lessons from a practical lithographer).

**A. B.**—The time is come when the question of decorating or desecrating St. Paul's Cathedral is to be discussed in earnest. Namely, pamby criticism will avail nothing now. Besides, you should have signed your name.

## Correspondence.

## HOSPITAL SATURDAY.

(To the Editor of the BUILDING NEWS.)

**SIR,**—I congratulate myself that my letter, which you were good enough to publish, has drawn forth so generous a reply from Mr. Hems.

I heartily second his idea of a BUILDING NEWS Hospital Saturday as an auxiliary to the London Hospital Saturday Fund, so that the amount which will be generally collected on the 17th October may be commensurate with the magnitude of the movement, and the necessities and deserts of hospitals and dispensaries. A BUILDING NEWS Hospital Saturday, the amount collected being placed to the credit of the common fund, is, indeed, an idea worthy of consummation, and will reflect credit on the proposer, whose appeal to you I endorse, and I do trust whatever facility you, as Editor, can afford to a BUILDING NEWS Hospital Saturday will not be withheld. If I can be of service I shall be glad to be commanded in any way, and I am sure many members of the profession will, like myself, follow Mr. Hems's advice, and subscribe their mites towards carrying out the idea.—I am, Sir, &c.

FRANK E. THICKE.

5, Great Queen-street, Westminster.

June 30th, 1874.

## BUILDING STONES IN SMOKY TOWNS.

**SIR,**—Your correspondents, "Quantity Surveyor," and Mr. Hems, who have favoured me with discussing my letter on the above subject, are unwilling to admit that Portland, Bath, and other freestones decay, sooner or later, from the effects of the acids of the London atmosphere. Permit me, then, to refer them to evidence which will have more force than the assertion of an individual, viz., to the Report of the Royal Commission of 1837; to the Paper on the Decay of Stone, by Mr. Pain, A.I.C.E., in the BUILDING NEWS of May 26, 1871; to that of Mr. Walton, A.I.C.E., in the BUILDING NEWS of Feb. 9, 1872; to another in the *Pall Mall Gazette*, of March 26, 1872; to references to buildings in London, showing decay, in "Stuart's Dictionary of Architecture;" to Professor Ansted, on the Decay of Stone, in "Geological Gossip," published by Routledge, in 1863; to the papers of Mr. Conybeare, the architect, in the *Fortnightly Review* for November, 1867; and, finally, to Dr. McCormack's report to the Lambeth Vestry, in 1873, after the Archbishop's complaint of the destructive effects of the neighbouring manufactories, wherein he states that he had discovered, by analysis, traces of hydrocyanic acid in the centre of the specimen of stone from the Palace. We know what the effect of this acid would be on carbonate of lime.

In answer to "Quantity Surveyor," I may say that I did not reply to Mr. Trickett's assertion that granite in the City was as dirty as freestone, because I felt it would not have much weight with any unbiased person, using not only his eyes, but his reflective faculties. In consequence of the excessive height of City buildings, the narrowness of the streets, and the projection of large cornices, certain small portions of granite work do not come in for nature's cleaning operation with wind and rain; and, let me admit it, are dirty. But so, under the same circumstances, are plate-glass windows. The use, however, of a pail of water and a broom would immediately remove the deposit; whereas it would take hours, if not days, to clean a corresponding surface of freestone. Does it not speak volumes that Mr. Trickett can bring forward no other specimen of decayed granite out of the scores he saw in the City? The granite at the General Post Office is possibly in the bad condition stated. I have not seen it. Granite, like all other materials that can be named, varies in quality. At the time this building was erected, there were scarcely any varieties in the market to choose from; since then, however, steam communication, by sea and land, has enabled us to procure the choicest and most durable kinds at half the cost. A solitary unfavourable example, after the many I have furnished of granite buildings, some nearly 100 years old, perfectly free from decay, cannot, I think, be accepted as damaging my proposal one iota. His suggestion for testing the extra cost of granite is not so "simple" as he asserts it to be, and I think he should have shown mine to be fallacious, before proposing another, involving so much labour and expense as to be virtually impracticable. If, however, it be so simple, why should he not proceed with it himself? and I have no doubt, Mr. Editor, that if you approved of the drawings, you would give your subscribers the pleasure of seeing them in the pages of the BUILDING NEWS. He must, however, first master the true character of granite details, which clearly will not consist of carved caps, strings, and cornices, as in freestone work.

My estimate was simple, without, as a comparative statement, sacrificing correctness.

Mr. Hems does not discuss the question at issue. I wrote about building in sooty London, with due regard to the extraordinary chemical condition of its atmosphere. Mr. Hems's examples of durable freestone are all from the country; mine were from London, and proved that freestone perishes there, while granite survives. To confute me Mr. Hems should have done the same. I agree with him that freestone is the right thing in the right place in the country, for there, with some exceptions I could name, it is generally durable.

My argument, therefore, is, that in buildings in London we should adopt granite as a material known to withstand the acids of the London atmosphere, instead of freestone, which is known to be more or less incapable of withstanding it.

A granite style would not suit Mr. Hems, who is an admirable carver of freestone in the round, and whose beautiful works, in the country, all who see them must admire. My proposition



need not raise class objections, for the number of freestone buildings in the country will always largely exceed those in towns. In conclusion, Mr. Hems's example, intended to show the relative cost of granite and freestone, is entirely misleading—the granite building is in the Classic style. Now, if an architect had to decide upon the most expensive and extravagant mode of building, he could not do better than adopt Classic details, worked out in granite. This is not at all my idea of a granite building.—I am, Sir, &c., T. Upper Sydenham, June 16, 1874.

#### A BUILDERS' IRONMONGERY SUPPLY ASSOCIATION, LIMITED.

SIR,—I sometime ago took the liberty of addressing a letter to you on the above subject, in the belief that the idea would be taken up, sifted, and, if worthy, adopted. From lack of opportunity I have been unable to bring the question more fully before your readers, who, I take it, consist mostly, if not entirely, of those who should feel an interest in it. I wish, with your permission, to re-introduce the subject; because I am still of opinion that such an association would confer permanent benefits—primarily to the members themselves, and ultimately to the whole of the building trade. Builders are, perhaps, the largest class of consumers, and, probably more than any other, are made the victims of high prices; both as regards labour, and the materials used in their operations. But while, despite the difficulties occasioned by trades-union agitation, they may yet understand and appreciate labour at its proper value, it has been found an impossibility to adequately estimate the value of materials, and particularly so in the face of those extraordinary fluctuations which have characterised the past few years. It may even be averred, that the trade has never known the advantage of possessing any reliable scale of prices for any class or quality of ironmongery goods. The system adopted by the vendors of these goods has been to draw the orders into their channel, under the pretence that both the prices of the articles, and the terms of payment, would be more advantageous to the buyer if had from a "factor" than could be obtained from the local ironmonger. While this may be true in some cases, it is not so as a rule; for builders pay as heavy a profit to the one as the other, and the idea, therefore, that, because they purchase from the factor they are obtained at first hand, and so are cheaper, is a delusion. There can be no doubt builder's factors get large profits; and, although it may be urged with some force that they (the factors) meet with more than a proportion of bad debts which considerably diminish their gains, yet it is obvious that those builders who, whether by dint of greater industry, stricter honesty and self-denial, or better "luck," pay their way well, also have to bear the burden of others' delinquency or misfortune. This, I admit, is due in part to a natural principle which pervades commercial transactions generally, and which, put into its simplest form, means "the good must pay for the bad;" but still I think it is possible to mitigate the evil somewhat, rather, perhaps, reduce the pressure due to its present mode of application, to a minimum one, and that by inducing the trade to become, through the medium of a Builders' Ironmongery Supply Association, both the vendors and the purchasers of ironmongery materials.

I have been surprised often in these days of co-operation that so many large building firms in the centre, as it were, of the hardware district, should not have associated long ago to obtain their goods at first hand. Equally am I astonished that a combination for this object has not been sought by those further removed from the producing centres, and who have had therefore to pay a higher price for their ironmongery in proportion to distance. It has repeatedly struck me that some system was absolutely necessary by which the master builders throughout the country might be mutually benefited, and in some measure reimbursed for the heavy losses sustained during an almost incessant conflict with trades-unionism (that to some must have been exceedingly damaging), through being compelled to carry out contracts under suddenly enhanced labour, both in the form of extra pay and reduced hours. Such an association as the one now proposed would undoubtedly, under proper management, be a decided financial success, and yield, with a minimum risk, the maximum profits of the factor, as well as numerous other advantages which could not well be detailed in the space at command. But one other distinctive

feature would be the very desirable one of issuing to the trade reliable price lists of the various classes and qualities of ironmongery goods, thereby enabling the contractor more exactly to calculate costs in these respects; and on this point it will be admitted that while an exaggerated idea of the cost of ironmongery would naturally swell an estimate, it would, on the other hand, occur that an under-estimate of the same would, in some cases, produce serious loss in the carrying out of a contract, and all this would be due to the present haphazard way in which builders' ironmongery is vended and bought.

I beg to suggest then, in conclusion, the formation of a "Builders' Ironmongery Supply Association, Limited," with a capital of, say £50,000, in 10,000 shares, to be subscribed only by the trade, or trades in their nature and requirements analogous to the building trades. The association would buy on the most advantageous terms, all goods required by the trade, and rightly denominated "builders' ironmongery," and sell at remunerative price to the trade, and profits declared, and mutually shared by the members, every six or twelve months, as may be arranged.

Should any of your readers feel interested in this matter it would be a pleasure at any time to give them all the information and assistance in my power.—I am, Sir, &c.,

GEORGE WAKEMAN.

Small Heath, Birmingham, June 16, 1874.

## Intercommunication.

### QUESTIONS.

[3384].—Shrinkage of Flooring.—It appears to be so difficult to get ordinary deal flooring, in 7in. or 9in. widths, to prevent from shrinking, so as to show a considerable crack between each board, that it would be exceedingly useful to know of a plan, not too costly, by which the boards could be fixed to the joists without nailing, so that, twelve or eighteen months' after they had been laid they could be wedged up again close together, and all the cracks, as it were, thrown into one, and filled in with one narrow closing board; the present system of putting a glued slip in each crack is both unsightly and inefficient. Perhaps some of your readers could suggest some appropriate method. I would gain the same end by lightly fastening the boards in the first instance, and after they had shrunk fully, taking them up and nailing them down permanently; but I am afraid that the jar and vibration caused by the hammer would damage the ceilings underneath.—L.

[3385].—Discoloured Yellow Pine.—I had a quantity of prepared yellow pine sheeting stowed in a room. Now, on its removal for fixing, I find it spotted and stained to such an extent, from want of ventilation, that I fear I shall have to get out others instead. Will some contributor kindly advise me what I should do to remove the discolouration?—D. MCJ.

### REPLIES.

[3370].—Constructing Cellar below Water Mark.—I beg to say that from my experience of Portland cement concrete walling, water will find its way through, even when the concrete is made in the ratio of 4 to 1; the best plan that I know of for cellar walling below water is to lay on a damp course of cement about 1in. thick and cement the outer face of wall from the damp course upwards to the required height; in this case the damp course should be near the floor line, so that the cement floor can join with it. I do not think that bricks laid in cement would be any better, but would require similar treatment to the above.—J. C.

[3377].—Reservoirs.—Your correspondent, "Beta," has created his own difficulty by copying inaccurately the formula given in Box's Hydraulics. The formula is,  $t = \left( \frac{\sqrt{D}}{10} + \cdot 15 \right) + \left( \frac{H \times D}{25000} \right)$  when  $H = 500$ ft. and  $D = 8$ in., we have  $t = \left( \frac{\sqrt{8}}{10} + \cdot 15 \right) + \left( \frac{500 \times 8}{25000} \right) = \frac{2 \cdot 82}{10} + \cdot 15 + \frac{8}{500} = \cdot 282 + \cdot 15 + \cdot 16 = \cdot 59$ in., the thickness given in Box's table. "Beta" should learn to copy correctly.—T. R.

[3380].—Flues of Kitcheners.—Surely the cause of the excessive draught and heat in the flue complained of by your correspondent, "Kitchener," must be the result of his neglect to use the dampers. If not, try the effect of opening the ventilator, which is, or ought to be, in the iron covering over the range which closes in the mouth of the chimney.—L.

[3380].—Flues of Kitcheners.—"Kitcheners'" kitchener is certainly being mismanaged when, as he writes, it consumes much fuel and heats the attics. Its flues are most probably all right; the fault is in opening the dampers too wide. When once the fire is fairly kindled the dampers should be nearly closed; the fire may thus be long maintained at an intense heat

without consuming much fuel, and so long as the dampers are open, even a little, this intense heat is conducted about the ovens, &c. Observe that if the fire can be maintained efficiently by passing 100 cubic feet of air through it in a certain time, then its heat is distributed into that 100 cubic feet; but if 200 cubic feet are passed through the fire by opening the dampers too wide, then each cubic foot of air is heated only half as much as before, thus producing an excessive quantity of deficiently heated air instead of a small quantity of intensely heated air. I noticed at the recent exhibition of Kitcheners, &c., in Salford, that several very powerful ones were fitted with 6in. stove pipes of only about 20ft. in height, which proved amply sufficient in draught. Compare this 6in. pipe draught with "Kitcheners'" flue, say 14in. by 9in. and 50ft. high. It is evident that the dampers here should be almost closed, or else an opening made into the flue to ventilate the kitchen and thereby cool the flue. I recently proved to an incredulous cook, by experiments of three successive half-hours with a close kitchener, that opening the dampers full wide cooled the ovens and boiler, and nearly closing the dampers greatly increased the oven &c. heat, and also economised the fire.—J. CORBETT, 78, Cross-street, Manchester.

[3381].—Thickness of Water Pipes.—In answer to "Beta's" query, I think the error is in the sign + for × between the bracketed quantities, this would give a value to (t) of 69in. In Molesworth's "Pocket-book" a formula is given, which when calculated by the given data gives 586 as the value of (t).—VI ET VIRTUTE.

[3382].—Water Supply.—If a uniform gradient can be obtained, an earthenware glazed pipe would best answer "J. H. H.'s" purpose. The joints ought to be caulked with good sound hemp or flax rope yarn and best Portland cement. Notwithstanding all possible care taken in laying them, common agricultural drain-pipes get choked with roots, &c., and become a great nuisance, and very expensive to maintain. Of course the diameter of the pipe will be regulated according to the quantity of water to be delivered.—R. L.

[3385].—Liability of Architects.—Six years ago I restored a church. The committee and churchwardens employed one of their parishioners as clerk of works, and had the plans, specifications, and contract deposited with him. When the works were completed I went over and measured up all extras and deductions, and sent in a detailed account of same, and also certified that the works were completed according to the plans and specifications. Since then the lead in a gutter has cracked, and upon cutting out a piece it was found the whole of the lead used was nearly a pound to the super-foot lighter than specified, and upon those grounds (my certificate) the parson and committee call upon me to re-linate it with lead of the proper weight, as specified. Am I liable to do so? Their solicitor says yes, mine says no; I do not wish to be pulled into a lawsuit between the two, and an opinion on the subject will be esteemed by.—NEMO.

### STAINED GLASS.

BADDESLEY CLINTON.—The chancel window of this church has been restored by Messrs. Camm Brothers, of Smethwick, near Birmingham. The parts for figures, arms, and subjects, which it formerly contained, have been rearranged and completed as follows:—In the centre is the Crucifixion; on either side in the foremost tiers, SS. George and Catherine; and underneath are members of local families.

WHICHFORD.—A stained-glass window, the work of Messrs. Holland, Son, and Holt, of Warwick, has recently been placed in the church of Whichford, Shropshire. The window represents Our Lord as the Good Shepherd, and the Parable of the Sower.

### STATUES, MEMORIALS, &c.

EDINBURGH.—The officers of the 91st Highlanders are erecting a drinking-fountain on the Castle Esplanade, Edinburgh. Messrs. Stewart M'Glashan and Son are the designers and sculptors. The material is Birney Quarry stone, and the design is a simple basement projecting from the wall, containing a horse-trough, &c., and above this are three tablets, the centre one carrying the armorial bearings of the regiment.

LEAMINGTON.—A drinking-fountain has been erected at Leamington to the late Mr. W. J. Clement, some time Mayor of and M.P. for the borough. Mr. John Gibbs, of London, was the architect, Mr. J. Durham, A.R.A., the sculptor of the bronze medallion portrait. The style of the memorial is Byzantine.

MEMORIAL TO THE LATE LORD DERBY.—The first of the series of statues of statesmen which are to be placed in the gardens opposite Palace-yard is now nearly completed, and on Tuesday morning the full-sized figure in bronze of the late Lord Derby, the work of Mr. Noble, was hoisted on the pedestal erected for it there. A statue of Lord Palmerston is to be erected in the adjoining garden.

STATUE OF RICHARD COELEN FOR BRADFORD.—Mr. T. Butler, sculptor, of London, has had on view in the rooms of the Chamber of Commerce, Bradford Exchange, a half-size sketch model of Richard Cobden. The finished figure is intended to be some 7ft. 3 or 4in. in height, and is proposed to be placed on a pedestal in the Bradford Exchange at the end opposite the Bank-street entrance. Messrs. Lockwood and Mawson, architects, Bradford, have drawn a sketch for the pedestal, and it has been suggested that the name of



"Cobden" should be placed in the centre, surrounded with the motto, "Free trade, peace, goodwill among nations."

#### WATER SUPPLY AND SANITARY MATTERS.

**BARNSELY.**—Owing to an injunction having been obtained against the Barnsley Corporation prohibiting that body from polluting the river Dearne by sending their sewage into it, a new scheme has been brought forward by Mr. Hawkesley, the eminent engineer. He proposes to take the sewage matter to Burton Grange, about two miles from the town, and to put it on land to be purchased for the purpose. The estimated cost of the scheme is £50,000. The Corporation also contemplate certain improvements for the widening of the streets, and the making of a market, which will also cost about £50,000.

**MALDON.**—The Maldon Town Council on Monday week determined that a complete system of drainage for the town should be carried into effect, and resolved to appoint a competent engineer to determine as to the best system.

**SKELMERSDALE.**—The recently-formed local board of Skelmersdale have resolved to erect new offices, with a dwelling attached, for the surveyor; and have also authorised Mr. Goodison, C.E., to prepare a scheme for the sewerage of the place, with an estimate of its cost. That gentleman has also laid before the board five schemes for supplying the district with water. Of these he gives preference to the "Scarth Hill scheme," the estimated cost of which is £13,800.

#### LAND AND BUILDING SOCIETIES.

**NORTH STAFFORDSHIRE PERMANENT ECONOMIC BUILDING SOCIETY.**—The tenth annual report of this society has just been issued. The stock account shows a balance in favour of the society of £1,237. 16s. 9d. The committee recommend a dividend of 2 per cent. upon the amount of subscriptions received.

#### LEGAL INTELLIGENCE.

##### COMPENSATION CASES BY ARBITRATION.

**DYER v. THE LONDON SCHOOL BOARD.**—This was a claim for compensation in respect of Mr. Dyer's yearly interest in the premises, No. 26, Walnut-tree-walk, Lambeth, required by the London School Board for the erection of a new school. It was referred to Mr. George Pownall, who took Mr. G. Fuller's (Messrs. Fuller and Fuller) evidence, as well as that of other witnesses, at Westminster Palace Hotel. Subsequently Mr. Pownall's award was received, amounting to £206, being within some £20 of the amount which Messrs. Fuller had agreed to settle at.

**PICTURES IN CHURCHES.**—THE STATIONS OF THE CROSS.—The Judicial Committee of the Privy Council has upheld the decision of the Dean of Arches with respect to the want of *locus standi* of the prosecutor in the case of "Legg v. Fagg and Mummery." This was an action instituted by the Archbishop of Canterbury in the name of his secretary against the churchwardens of St. Peter's Church, Folkestone, for having the Stations of the Cross painted on the church walls. The objection that Mr. Lee was not a parishioner, and had no interest in the case, was taken in the Commissary Court of Canterbury, but Dr. Tristram overruled it. On appeal the Dean of Arches overruled the Commissary-General's judgment, and on reappeal the Dean's ruling has been upheld.

**PLAYFORD v. THE METROPOLITAN BOARD OF WORKS.**—WAPPING IMPROVEMENT.—This was a compensation claim in respect of Mr. Playford's interest in the leasehold premises, No. 71, High-street, Wapping, required by the Board of Works for the widening of that thoroughfare. The case was argued at the Institution of Surveyors, before Mr. George Prickett as umpire. Mr. Fuller, instructed by Messrs. Morley and Sheriff, gave evidence on the part of the claimant as to the value of the lease, which he placed at £924, Mr. Murrell at £743; but, on the other side, Mr. Horsey said the lease was not of any value, and Mr. Clifton put it at £231. Mr. Prickett's award has now been made, amounting to £1,140, including damage by removal.

### Our Office Table.

**APPOINTMENT OF BUILDING TRADESMEN TO THE CORPORATION OF LONDON.**—The Court of Common Council has appointed the undermentioned firms to execute such ordinary work, usually performed by City tradesmen, as the Corporation may require them to execute for one year, from Midsummer, 1874, viz.: Plasterers, Messrs. Browne & Robinson; bricklayers, Messrs. Browne & Robinson; plumbers, Messrs. Harrison & Sons; painters, Messrs. Harrison & Sons; carpenters, Messrs. Browne & Robinson; smith and lampfitter, Mr. John Farrand Clarke; glaziers, Messrs. Pitman & Cuthbertson; upholsterers, Messrs. Cooper & Holt.

**ASCOT AND ITS NEIGHBOURHOOD AS A HEALTH RESORT.**—Few Londoners, except the

disreputable people who go to the races, know that one of the healthiest and most beautiful tracts of country in England is within forty minutes' ride of London. From the grand stand at Ascot and from other points in the vicinity, the eye ranges over an expanse of park-land and forest which extends northwards almost to Windsor. The salubrity of the district is remarkable, and is doubtless due to its position upon the celebrated Bagshot Sands. Till very lately the property owners of the locality steadily refused to part with an acre of their possessions; but the high prices obtainable, we suppose, have at last tempted some of them, and under the supervision of Messrs. Vigers, the well-known surveyors and estate agents, a large number of eligible sites have been selected for the market. The South-Western Railway Company has just obtained a Bill for the construction of a new line which will connect the Sunninghill district with the main line at Aldershot. This will tend greatly to the development of the neighbourhood.

**CREMATION IN 1800.**—The *Lancet* points out that at the beginning of this century a vast project was laid before the municipal authorities of Paris for the burning of the dead. It was proposed to open, outside the capital, vast gardens, where either the usual burial or the reduction into ashes should take place, according to the wishes of individuals or their friends. A man named Cambry was the originator of the movement, and his proposal was viewed by the Government with favour. The paper he had sent in was ordered to be printed, and the plans of the architect, Molinos, were also engraved; but the matter fell to the ground, mainly owing to the political disturbances of the period.

**PALESTINE EXPLORATION FUND.**—We are sorry to have to announce the death, at the early age of 28, of Mr. Charles Tyrwhitt Drake, one of the officers in charge of the survey of Palestine. He died in Jerusalem on Tuesday week, after an illness of three weeks. Mr. Tyrwhitt Drake joined the survey at its commencement, and when Captain Stewart was compelled by sickness to return to England, took the command until the arrival of Lieut. Conder in the autumn of 1872. At the beginning of this year, a severe fever, caught in the malarious valley of the Jordan, proved nearly fatal. He recovered, but a second attack seized him, which he was unable to overcome. His loss is a very heavy one to the Committee of the Palestine Fund, and the "letters from Mr. Tyrwhitt Drake" will be missed by all the readers of their "quarterly statement."

#### CHIPS.

In Chips of last week's BUILDING NEWS, for "Ironbridge, Devon," read "Ironbridge, Salop."

A new Board School is about to be erected at S. Stephens-by-Saltash, Cornwall, at a cost of £590, to accommodate 160 children.

The report read on Tuesday at the annual meeting of the Metropolitan Drinking Fountains and Cattle Troughs Association stated that a greater number of new fountains and troughs had been erected in the past year than in any other during the Society's existence.

The foundation-stone of a new church, dedicated to St. John the Evangelist, was laid in Fisher-street, Red Lion-square, Holborn, on Tuesday. Mr. J. L. Pearson is the architect, and Messrs. Kirk and Co., of Woolwich, the contractors.

An altar and reredos in honour of St. Benedict have been erected in the (Roman) Catholic Church of St. Ann, Ormskirk, Liverpool, by Mr. Roddis, of Birmingham, from designs by Mr. Edmund Kirby, architect, of Liverpool.

S. Luke's Church, Wellingborough, is undergoing repair.

The foundation-stone of a new Wesleyan Chapel was laid at Halton on Thursday week. The cost is to be £3,000; the style, Early English; and the architect, Mr. C. O. Ellison, of Liverpool.

Mr. Henry Godwin, F.S.A., of Newbury, died recently. He was known as the author of the "English Archaeologist's Handbook."

The tomb of Abelard and Heloise, in the Cemetery of Pere-le-Chaise, at Paris, is to be restored. It was built from designs by a M. Lenoir, some fifty years since, and certainly wanted restoration, the last time we saw it, very badly.

### CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHERVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB AND SON,  
Makers to the Bank of England,  
57, S. Paul's Church-yard, E.C.  
And 68, S. James' street, S.W.—[ADVT.] } London.

## Trade News.

#### WAGES MOVEMENT.

**GREENOCK.**—The Greenock master joiners have agreed, in compliance with a promise, to raise the operatives' wages to 8d. per hour.

**LEEDS.**—The strike in the building trade at Leeds has ended, the Association of Master Builders having conceded the terms demanded by the men.

### The Timber Trade.

Wholesale prices of Timber, Deals, &c.:—

		Per 120, 12ft. 1½ by 11.		£ s.	
Gothenburg, 1 & 2 yel.	4 by 9	15	0		
"	3 by 9	15	5	to	15 10
"	3rd " 4 by 11	14	10		
"	" 2½ by 7	13	10		
Gefee, 1st and 2nd	4 by 11	16	0		
"	3 by 9	16	5		
"	2 by 9	16	0		16 15
"	2½ by 7	14	0		15 0
"	2½ by 9	15	15		
"	1 by 7	12	0		
"	white 2½ by 7	12	5		
"	3 by 9	12	10		
"	3rd " 3 by 9	15	5		
"	3rd " 2½ by 9	15	0		
"	3rd " 2½ by 7	14	0		14 10
"	3rd " 2 by 9	14	0		
Hernosand, 1 & 2 yel.	3 by 9	15	0		
Pitch Pine		12	0		13 0
Kotka, 1st & 2nd yel.	3 by 10	13	0		
"	3 by 7	12	10		
"	3rd " 3 by 10	11	15		
"	3rd " 3 by 9	12	0		
"	1st & 2nd white boards	10	10		
Hudickswall, 1st yel.	4 by 8	14	10		
"	2nd " 3 by 11	13	10		
"	1st " 3 by 7	14	10		
"	1st " 2 by 7	14	0		
"	1st " 3 by 10	14	0		
"	3rd " 1½ by 9	13	5		13 10
"	4th " 4 by 12	13	5		13 10
"	1 & 2 white 2½ by 7	12	0		
"	3rd " 3 by 9	11	10		
"	3rd " 2½ by 8	11	0		
Drontheim, 1st yellow	3 by 9	12	5		12 10
"	1st white 3 by 11	11	10		
"	1st " 3 by 9	11	5		
"	3rd " 3 by 9	10	10		
Ljusne	3 by 9	13	0		
Wyburg, 2nd yellow	3 by 11	12	0		
Soderham 1st & 2nd yel.	3 by 9	16	10		
"	2 by 8	14	10		
"	2 by 7	14	0		
"	3 by 10	14	0		
"	3rd yellow 4 by 11	14	5		14 10
"	3 by 9	15	10		
"	4th " 3 by 9	14	5		14 10
Narva, crown white	3 by 9	13	0		
"	2nd " 3 by 11	13	0		
"	3 by 9	12	5		12 10
Memel, 2nd yellow	4 by 9	14	10		
"	3 by 9	13	10		
Petersburg, 1st yellow	3 by 9	16	0		
Soroka, 1st yellow	3 by 11	16	10		
Norkopin, 1st & 2nd yel.	3 by 9	16	5		16 10
"	3rd yellow 4 by 9	15	0		
Petersburg, 1st white	3 by 9	14	0		
"	2nd " 3 by 11	12	10		
Swartwick, 1 & 2 yel.	3 by 9	16	0		
"	3 by 7	15	10		
Quebec, 1st brt. 12ft up.	3 by 11	22	15		
"	2nd " 12ft. 3 by 11	16	0		
"	3rd " 3 by 11	13	10		13 15
"	1st dry floated, 12ft (wide)	23	5		23 10
"	1st floated	21	10		
"	12ft. (2in.)	19	0		
Riga, half crown white	3 by 9	11	0		
		Per 120 12ft., 3 by 9.			
Saguenay, unsorted spruce		19	10		
		Per 120 12ft., 2½ by 6½.			
Dram, 2nd yellow	2 by 6½	11	10		
"	3rd " 3 by 6½	10	10		10 15
"	" 2½ by 6½	11	10		
"	2nd white 2½ by 6½	11	5		
"	3 by 7	10	10		
"	3rd white 3 by 7	10	5		
"	3 by 5	10	0		
		Per 120 12ft., 1½ in.			
Memel, 2nd yellow, 4in.		14	0		
"	3in.	13	5		13 10
		Flooring per square.			
Fredrickshald 1st wht.	¾ by 7	13	3		
Fredrickstadt 1st yel.	1½ by 6½	19	6		
"	¾ by 7	13	6		
"	2nd yel. 1 by 7	14	6		
"	¾ by 7	12	6		12 9
"	1st wht. 1 by 7	14	6		
"	1 by 6	14	3		14 6
"	2nd wht. 1 by 6	12	9		
"	3rd wht. 1 by 6½	13	9		
"	¾ by 7	12	6		
Skien 1st yellow	¾ by 6½	12	0		



		s.	d.		s.	d.
Skien 1st yellow	by 6	10	3			
" 2nd yellow	by 6½	10	9	"	11	0
" "	by 6	9	0			
Dram 1st white	by 5	11	6			
" 2nd white	1 by 5	11	6			
" "	1½ by 5	13	9	"	14	0
" Do. Grooved, Tongued, and Beaded.						
Skien 1st yellow	by 6	11	0			
Fredrickstadt 1st wht.	by 6½	10	3	"	10	6
Fredrickstadt 2nd yel.	by 6	11	9			
Gothenburg 1st yellow	by 7	10	6			
Christiana 1st yellow	by 7	12	9	"	13	0
Per 50 cubic feet.						
Dram yellow balks		45	0			
Quebec yellow pine		105	0	"	110	0
Pitch pine		70	0	"	75	0
Sundswall fir		66	0			
Dantzic crown fir		95	0	"	97	6
" common middling		85	0			
Sundswall yellow balks		50	0			
" white balks		48	0			
Per 216 cubic feet.						
Petersburg		11	0			
Dantzic		8	10			

**GREENOCK.**—The *Glasgow Herald* states that Mr. A. Crawford, timber merchant, of Greenock, has been unable to meet his engagements. The liabilities amount to about £50,000, against assets representing about 12s. 6d. in the pound.

### WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay. For samples and further particulars, apply to the MANAGER, at the Quarries Narberth Road, R.S.O. [ADVT.]

### TENDERS.

**BARNES.**—For erecting villa residence with coach-house and stables, for Mr. J. R. Wedgwood. Mr. J. Palmer, architect. Quantities by Mr. W. Barnett.

Stimpson	£2,480 0 0
Chamberlain Bros.	2,399 0 0
Thorn	2,375 0 0
Adamson	2,289 0 0
Boyce	2,254 0 0
Trevena	2,223 0 0
Hunt	2,125 0 0

**CORK.**—For additions and alterations to Ballinavullin. for Mr. Thos. Carroll, J.P. Mr. Robert Walker, architect and engineer, 17, South Mall, Cork.

Murray (building contractor)	£1,900 0 0
Higgins (Plumber)	
Bible (Painter)	

**CORK.**—For additions and improvements to Endsleigh, for Mr. J. C. Ledlie. Mr. Robert Walker, architect and engineer, 17, South Mall, Cork.

Delany	£1,096 0 0
Creen	1,611 16 5
Terence O'Flynn	1,046 10 0
E. and P. O'Flynn	1,003 0 0
Longfield	990 0 0
Thomas	963 0 0
Walsh	932 0 0
McSweeney	887 0 0

**LONDON.**—For proposed master's house and other works at S. Paul's schools, Bethnal Green. Mr. Thomas Pocock, surveyor.

Parsons Bros.	£559 10 0
Bulhvant	557 0 0
Hopton	523 0 0

**LONDON.**—For new studio, Cadogan-gardens, for Mr. F. Moscheles. Mr. W. Petit, architect. Quantities by Messrs. George Lansdown and Pollard.

Stephenson	£1,590 0 0
Bird	1,561 0 0
Adamson and Son	1,493 0 0
Mills and Son	1,490 0 0
Stimpson and Co.	1,440 0 0
Cullum	1,396 0 0

**LONDON.**—For the erection of a shop and warehouse at 185 and 186, Tottenham-court road, for Mr. G. F. George. Messrs. J. Tarring and Son, architects, 69, Basinghall-street, E.C.

Kelly Bros.	£2,683 0 0
Jackson and Shaw	2,642 0 0
Wild	2,610 0 0
Cooke and Green	2,588 0 0
Shurmer	2,572 0 0
Roberts	2,538 0 0
Boden	2,390 0 0
Brindle	2,318 0 0

**LONDON.**—For rebuilding the "Peacock" public-house, Maiden-lane, Covent-garden. Mr. Chas. Fowler, architect. Quantities by Mr. H. Lovegrove.

Conder	£1,690 0 0
Longmire and Burge	1,318 0 0
Wall	1,285 0 0
Crabb	1,178 0 0

**RAMSGATE.**—For addition to "Tenby House, for Mr. J. Vinten. Mr. John R. Collett, architect. Proprietor finds all bricks.

Cavender (accepted)	£212 10 0
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**STONEBRIDGE PARK.**—For the erection of coach-house and stabling, Hampton Lodge. Mr. Wm. Bradbear, architect.

Prebble and Morley	£199 0 0
Steel	188 0 0

**SURREY.**—For finishing a pair of villas at Wallington. Mr. Wm. Bradbear, surveyor.

Crowley	£1,489 0 0
Steel	1,252 0 0
Prebble and Morley	1,040 0 0

**S. PANCRAS.**—For additions to the administrative department of the S. Pancras baths and washhouses. Mr. Henry H. Bridgman, architect.

Wilson Bros. (accepted.)

**TRALEE.**—For new lock-gates and sluice-valves, for the Tralee Harbour Board. Mr. Robert Walker, architect and engineer, 17, South Mall, Cork.

Steel and Sons ..... £415 0 0

**WEST BROMPTON.**—For the Church of the Sacred Hearts of Jesus and Mary, exclusive of foundations and granite pillars. Messrs. Jos. A. Hansom and Son, architects.

Gorringe	£7,150 0 0
Dickens	7,000 0 0
Bowles	6,857 0 0
Dover, Son and Co.	6,851 0 0
Sharpling and Cole	6,397 0 0
Sawyer	6,151 0 0
Farmer and Brindley	5,459 0 0
Rudkin	5,795 0 0
Stephenson	5,780 0 0
Simpson	5,733 0 0
Staines and Son	5,664 0 0
Little	5,520 0 0
Wright Bros., and Goodchild	5,500 0 0
Niblett and Son	5,300 0 0
Grimwood and Sons	5,160 0 0

\* Delivered too late by post.

**WILLESDEN.**—For alterations and additions to "Woodthorpe." Mr. Wm. Bradbear, architect, 8, Comberton-road, Upper Clapton-road, N.E.

Knight	£275 0 0
Prebble and Morley	273 10 0
Steel	268 16 0

### BATH AND OTHER BUILDING STONES OF BEST QUALITY

**RANDELL, SAUNDERS & CO., Limited.** Quarrymen and Stone Merchants.

List of prices at the Quarries and Depots, also cost of transit to any part of the United Kingdom, furnished on application to

BATH STONE OFFICE: CORSHAM, WILTS. [ADVT.]

### PORTLAND STONE OF BEST QUALITY.

IN BLOCK OR SAWN. THE PORTLAND STONE COMPANY (LIMITED) QUARRYMEN AND STONE-MERCHANTS.

For List of Prices and Cost of Transit by Sea or Rail, apply to the PORTLAND STONE COMPANY (LIMITED), ISLE OF PORTLAND, DORSET. London Depots at South Western and Great Western Railways.

### COMPETITIONS OPEN.

**BIGGLESWADE SCHOOL BOARD.**—For plans for schools to accommodate 520 children. Mr. T. J. Hooper, Clerk to Board, Biggleswaide.

**COCKERMOUTH, Aug. 12.**—For plans for a girls' school. Mr. J. Fearon, Cockermouth.

**HASTINGS, Sept. 24.**—For designs for a new Town Hall, with police offices, lock-ups, public offices, &c. Premiums of £100, £50, and £25 will be given for the three most approved designs. Mr. G. Meadows, Town Clerk, 8, Bank-buildings, Hastings.

**IMPROVED INDUSTRIAL DWELLINGS CO., Limited.**—For designs for the erection of dwellings for the working classes, on a large site in Goswell-road, E.C. Premiums of £250 for the first, and £150 for the second best designs. Mr. J. Moore, Secretary, 34, Finsbury-circus, E.C.

**Geometrical and Encaustic Tile Pavements** in every variety. Over Designs at 6s. 6d. per yard super. "The Tiles are excellent, both in quality and colour."—*BUILDING NEWS*. "They are of great excellence in design—the material is not surpassed by any found in this kingdom."—*Art Journal*. "The patterns are remarkably good and effective."—*Gardener's Magazine*, &c. &c. Designs and sample Tiles free on application to HENRY C. WEBB, Tiles, Worcester. London House, 114, Victoria-street, Westminster. Mr. T. Pulling, Agent.—[ADVT.]

### CONTRACTS OPEN FOR BUILDING ESTIMATES.

**ADMIRALTY, July 14.**—For the erection of a Coast guard station at Lydden Spout, Kent. Director of Works Department, Admiralty, Spring-gardens, S.W.

**BARROW-IN-FURNESS, July 14.**—For the construction of a reservoir and Tunnel Aqueduct. Mr. F. C. Sileman, 23, Great George-street, Westminster, S.W.

**LEWISHAM DISTRICT BOARD OF WORKS, July 15.**—For tar-paving, channelling, and metalling the roads. S. Edwards, Clerk to the Local Board, Grove-place, Lewisham.

**BREASTON, LEEDS, July 9.**—For the erection of a Temperance Hall in Old-lane. Messrs. Wilson and Bailey, Central Market Buildings, Leeds.

**DEPTFORD, July 13.**—For erecting a new school on the site of the old school in Wellington-street. Messrs. Wallen and Paxon, Architects, 26, College-street, E.C.

**FROME, July 6.**—For the erection of a new market house. W. J. Stent, Architect, Warminster.

**GREAT NORTHERN RAILWAY, July 9.**—For the erection of a goods warehouse and offices in Farringdon-road. Engineer's Office, Kings-Cross Station.

**GREENWICH, July 8.**—For paving the footways of Milton-court-road, Vanistart-street, Alexandra-street, and Rutt's-terrace. Mr. J. Spencer, Clerk to the District Board, Greenwich.

**HOUNSLOW, July 6.**—For the erection of a girls' school and two teachers' residences. Messrs. Tress and Innes, Architects, 27, Queen-street, City.

**KNARESBORO' CEMETERY, July 13.**—For erecting boundary walls, and constructing and draining roads. Messrs. Robinson and Marshall, architects, Tyrrel-chambers, Tyrrel-street, Bradford.

**LEEDS, July 11.**—For the erection of a house in Roundhay-road. Mr. D. Dodgson, Architect, 18, Park-road, Leeds.

**MANCHESTER SCHOOL BOARD, July 11.**—For the erection of Board schools in Chester-street, Ardwick. Messrs. Royle and Bennett, Architects, 71, Princess-street, Manchester.

**NORTH WALES, July 10.**—For the construction of a reservoir in Vaynol Park. Mr. F. Jackson, C.E., Nottingham.

**OXFORD.**—For the erection of S. Aloysius Church, S. Giles-road. Messrs. Hansom and Son, Architects, 8, Summer-terrace, Onslow-square, S.W.

**PICKERING, YORKSHIRE, July 11.**—For alterations and additions to the Union Workhouse. Messrs. John Gibson and Son, architects, Malton.

**PORTSMOUTH, July 18.**—For the construction of a new gaol. J. Howard, Town Clerk's Office, Portsmouth.

**RAMSGATE, July 7.**—For the erection of a police station in York-street. W. A. Hubbard, Clerk to the Local Board, Town Hall, Ramsgate.

**S. PANCRAS, July 6.**—For the execution of paving works. C. Worrell, Clerk to the Paving Department, 10, Edward-street, W.

**SHEEPSHEAD, NEAR LOUGHBOROUGH.**—For the erection of a Wesleyan Chapel. Messrs. G. and J. F. Hodson, Architect, Town Hall, Loughborough.

**SWAFFHAM, July 6.**—For the erection of a new Primitive Methodist Chapel. Rev. J. Sculpters, Swaffham, Norfolk.

**TIPTON SCHOOL BOARD, July 7.**—For the erection of a girls' and infants' school. Mr. C. Round, Architect, 60, High-street, Tipton.

**WEM, July 7.**—For laying new sewerage works in New-street. H. Ponting Cox, Clerk to the Parochial Committee, Wem, Salop.

**WIDNES, July 7.**—For the erection of a market hall. Plans at the Board-room, Anne-street, Widnes.

**WOLVERHAMPTON, July 6.**—For the execution of certain works in the construction of two reservoirs, settling tanks, &c. H. Underhill, Town Clerk, Town hall, Wolverhampton.

**WORTHING LOCAL BOARD, July 6.**—For the supply of 1,522 ft. of iron pipe for water mains. W. Verrall, Clerk to the Local Board, Worthing.

### LATEST PRICES OF MATERIALS USED IN CONSTRUCTION.

(From the Public Ledger.)

	LEAD.			
Pig Foreign	per ton	£19 15 0	£20 0 0	
" Lead W.B.	"	22 10 0	23 0 0	
" Lead Co.	"	22 5 0	22 15 0	
" Other brands	"	21 0 0	21 5 0	
Sheet	"	22 0 0	0 0 0	
Sheet Patent	"	26 0 0	0 0 0	
Red or minium	"	23 15 0	0 0 0	
White Dry	"	28 10 0	29 0 0	
" ground in oil	"	0 0 0	0 0 0	

	COPPER.			
British—Cake & Ingot	per ton	£85 0 0	£87 0 0	
Best selected	"	87 0 0	89 0 0	
Sheet	"	92 0 0	96 0 0	
Bottoms	"	94 0 0	98 0 0	
Australian cake	"	87 0 0	90 0 0	
Spanish cake	"	0 0 0	0 0 0	
Chili Bars, cash	"	78 0 0	82 0 0	
" Refined ingot	"	0 0 0	0 0 0	
Yellow metal	per lb.	0 0 8	0 0 8	

	IRON.			
Pig in Scotland, cash	per ton	£3 17 6	£0 0 0	
Welsh Bar, in London	"	9 15 0	10 10 0	
" Wales	"	9 0 0	9 15 0	
Staffordshire	"	11 0 0	11 10 0	
Rail, in Wales	"	8 0 0	8 5 0	
Sheets, single in London	"	13 10 0	15 10 0	
Hoops, first quality	"	12 0 0	12 10 0	
Nail Rod	"	10 10 0	11 10 0	
Swedish	"	17 0 0	19 0 0	

	OILS & C.			
Seal, pale	per tun.	£36 10 0	£0 0 0	
Sperm headmatter	"	98 0 0	100 0 0	
Cod	"	39 0 0	0 0 0	
Whole, Cast Sea, pale	"	30 10 0	31 0 0	
Olives, Gallipoli	"	45 0 0	0 0 0	
Cocunut, Cochinn	"	39 0 0	40 0 0	
Palm, fine	"	37 0 0	0 0 0	
Linsed	"	29 0 0	0 0 0	
Rapeseed, English pale	"	33 5 0	0 0 0	
Cottonseed	"	26 15 0	27 0 0	

**MANUFACTURE OF COCOA.**—"We will now give an account of the process adopted by Messrs. James Epps and Co., manufacturers of dietetic articles, at their works in the Easton-road, London."—See article in *Cassell's Household Guide*.

**VENETIAN BLINDS.**—The only house in London where Venetian Blinds of the very best quality can be obtained for 7d. per foot, including fixing. These blinds are fitted with Patent Wave Venetian Ladders (no sewing required), and warranted for 5 years. — HENRY W. GREEN, Venetian Blind Manufacturer, 43, Canterbury-road, Kilburn, N.W.

### WOOD MOSAIC CARPETING (in

Webbs). Patented. 9d. to 1s. 6d. per foot. Trade discount. "The Wood Carpeting is polished and ready for laying, and being manufactured entirely by machinery, the widths match in pattern when laid side by side, while the joints are as perfect as those of the finest inlaid floors," &c. — *Glasgow Herald*.

Agent: Mr. ALBERTON, 23A, Maddox-street, London; or to A. GARDNER and SON, Makers, Glasgow.

**WOOD ENGRAVING TAUGHT** by an able PROFESSOR, the Author of two Handbooks on the Art.—For terms apply to Mr. GILKS, 11, King's-road, Bedford-row, London.

**WOOD ENGRAVING.**—Mr. GILKS, Author of two Handbooks on the Art, gives PRIVATE LESSONS, at his Studio, 11, King's-road, Bedford-row, London, W.C.

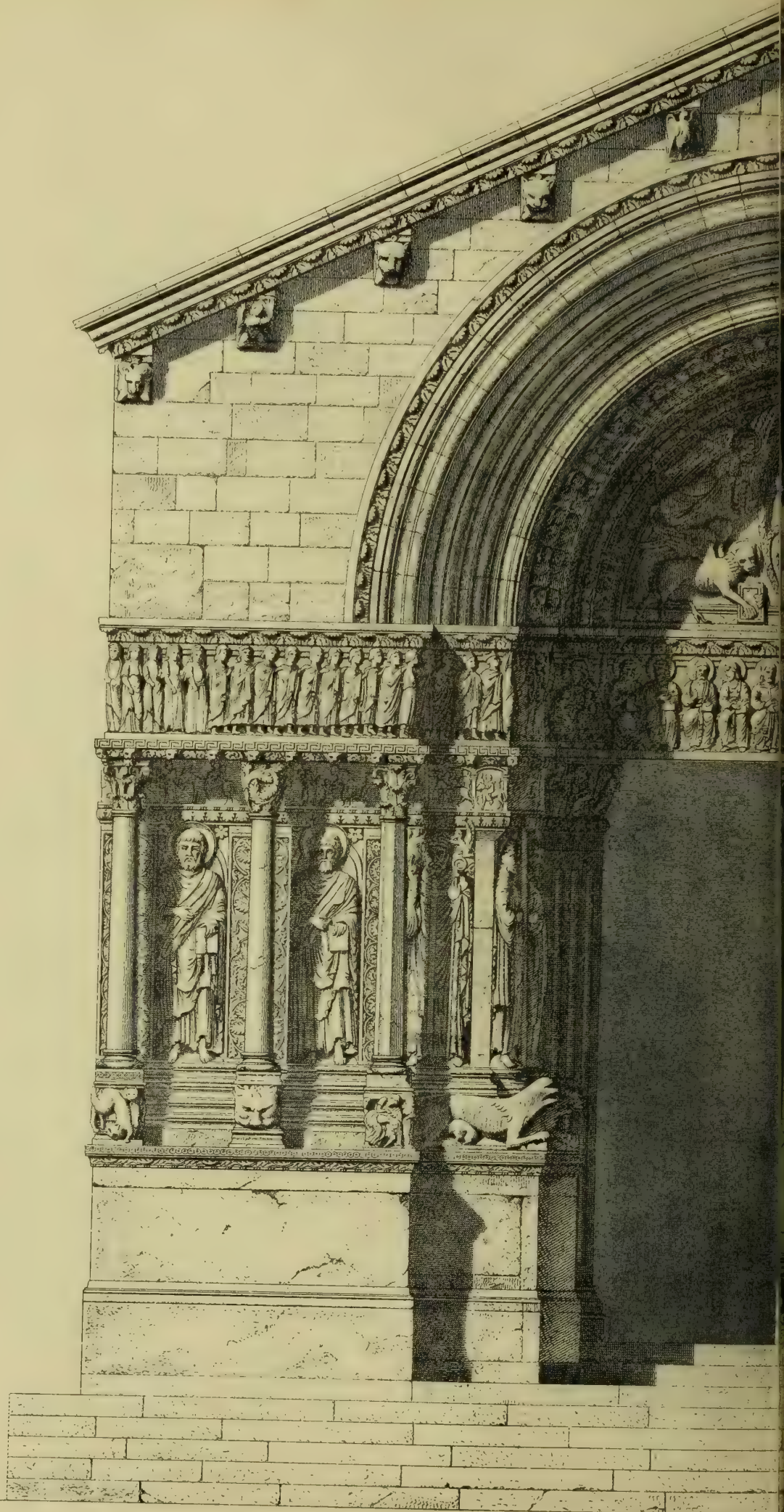
### THE STAMFORD TERRA-COTTA COMPANY (BLASHFIELD'S) LIMITED, STAMFORD, LINCOLNSHIRE.

Manufacturers of Terra-Cotta and Architectural Pottery. The Terra-Cotta made at these works is warranted to stand heat and frost, and is not injured by impure atmosphere. It will also bear a far greater weight or thrusting stress than Portland stone. Experiments in evidence of this were made by Mr. David Kirkaldy, 17th June 1868, the full particulars of which may be found attached to Mr. Charles Barry's paper on "Terra-Cotta," read before the Royal Institute of British Architects, 22nd June, 1868. LONDON SHOW ROOMS, 28, BERNERS-STREET, Oxford-street, W. All orders and letters relating to Contracts to be forwarded to the Works, Stamford, Lincolnshire. Amongst the recent works in Terra Cotta executed by J. M. Blashfield may be named the following:—Lady Alford's New Mansion, Ennismore Gardens, Sir M. D. Wyatt, Architect; Dulwich New College, Charles Barry, Esq., Architect (the whole of this building is of Brick and Terra-Cotta); Fine Art Museum, Boston, U.S. (the most elaborate Terra-Cotta Work on a large scale in America); Cocks and Biddulph's New Bank, Charing-cross; W. Wells, Esq., New Mansion, Holmewood.

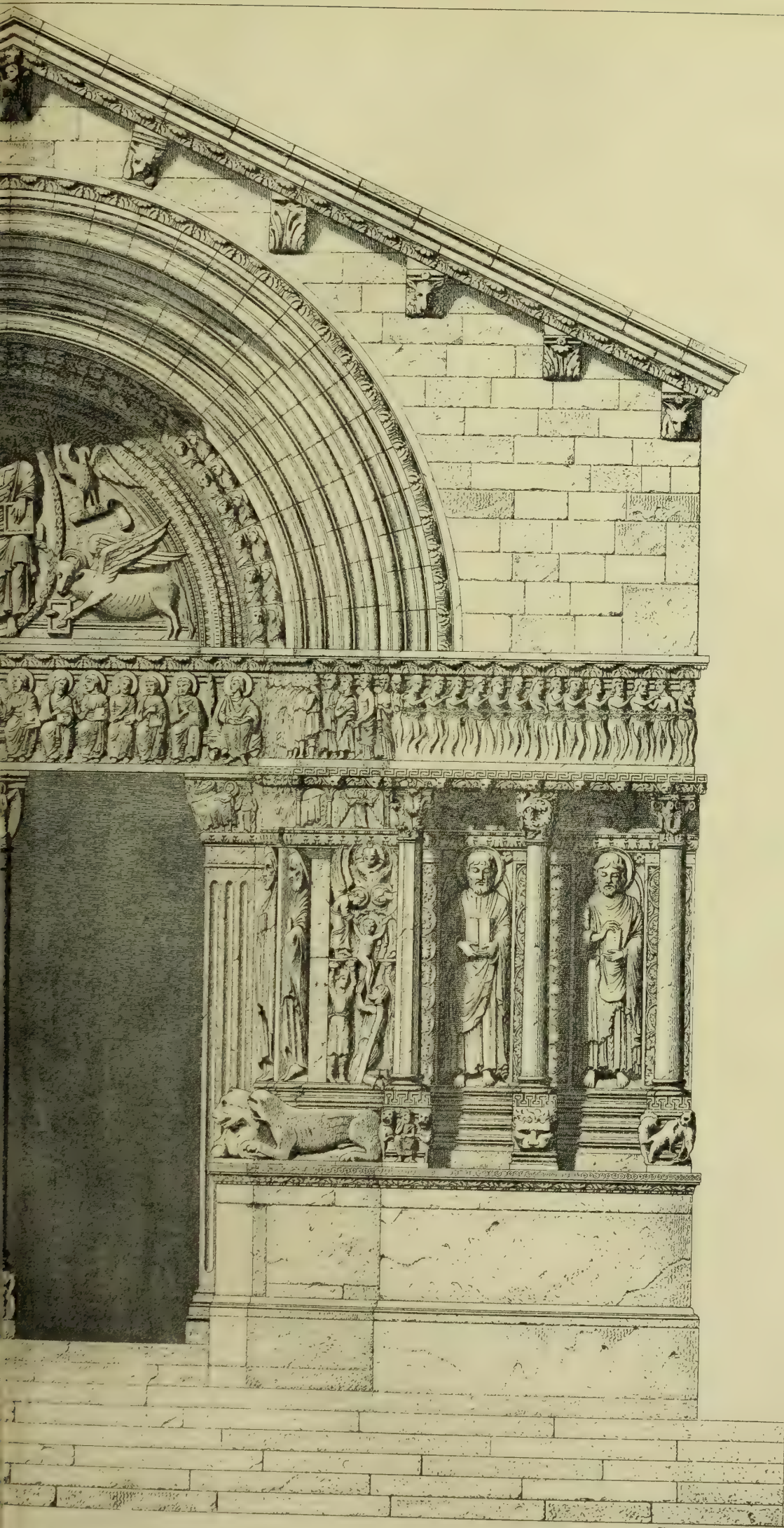












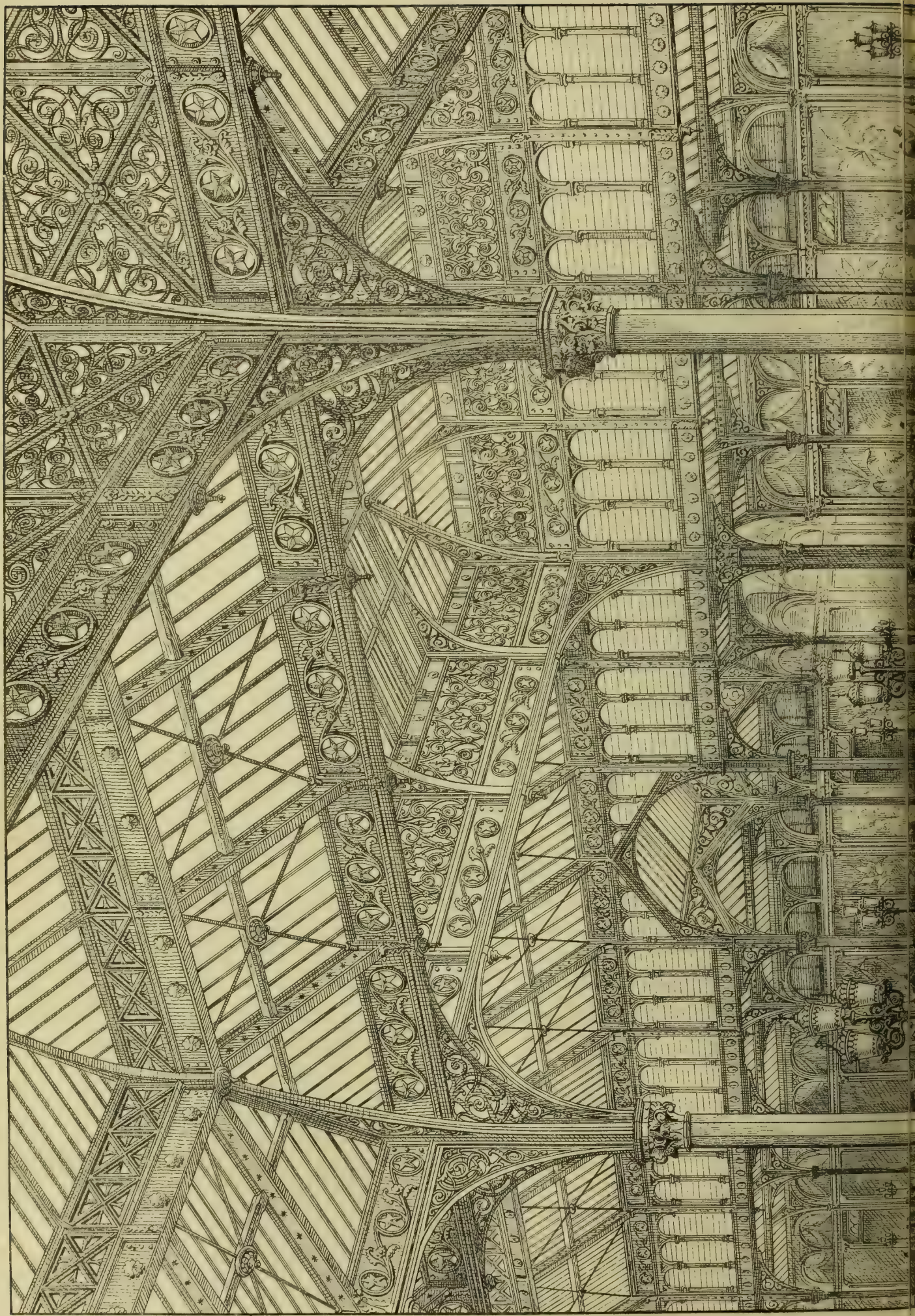




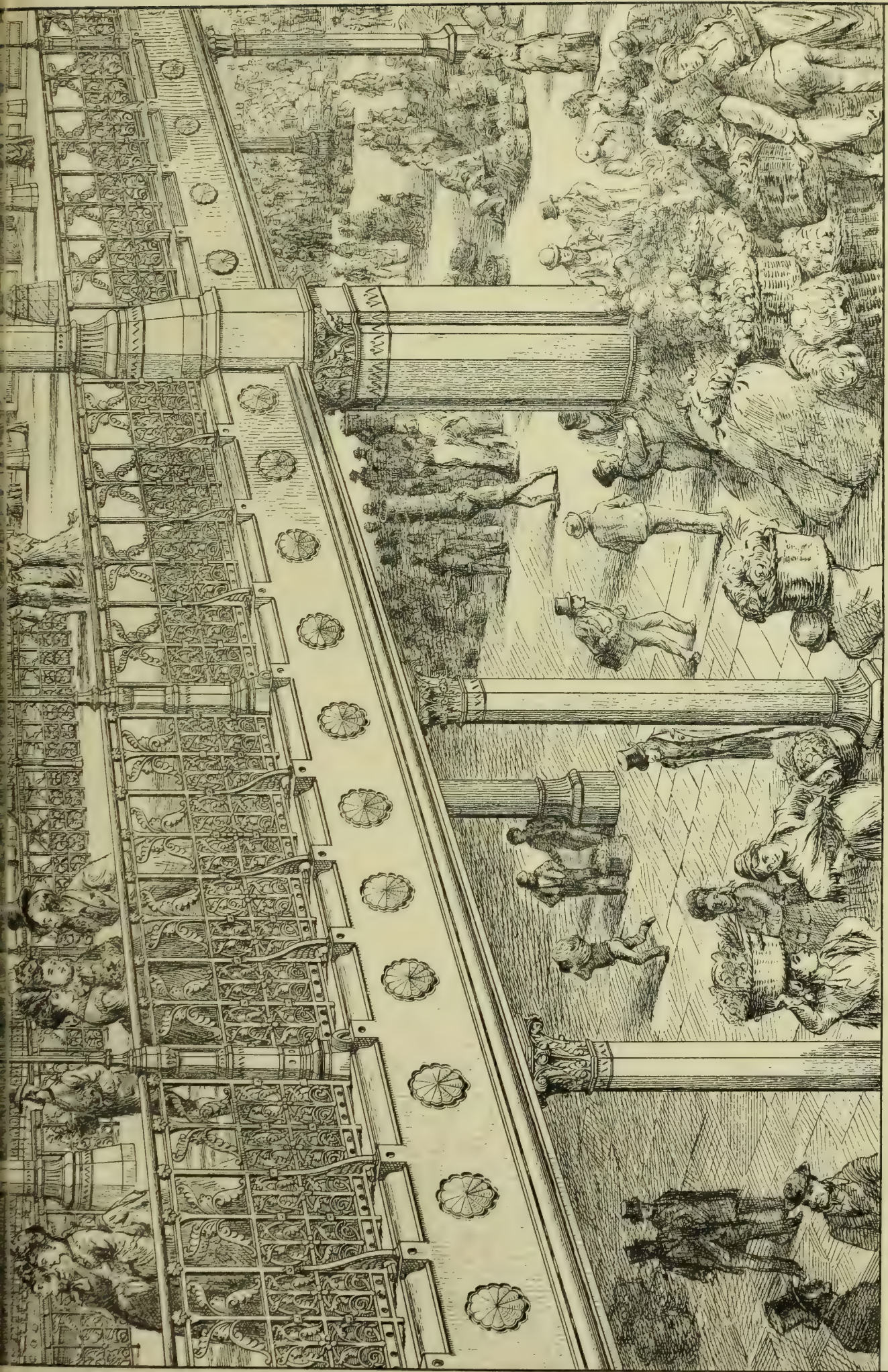












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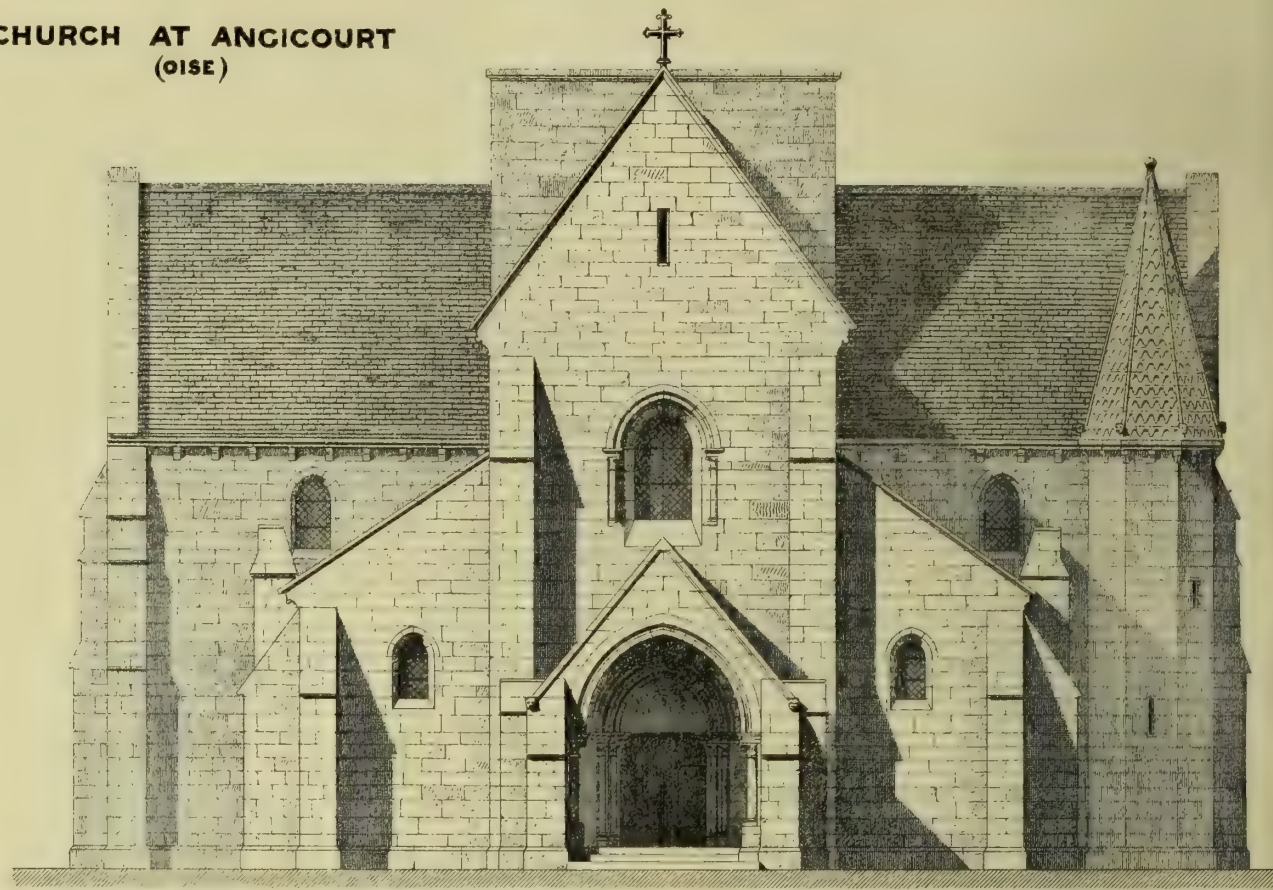




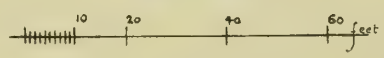
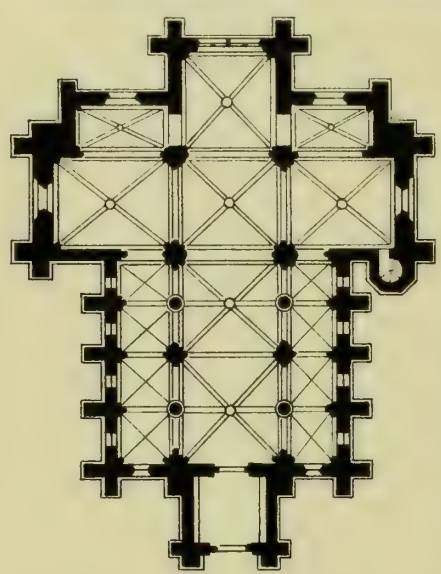
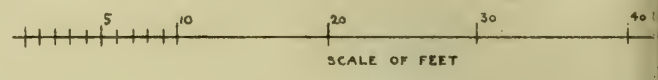




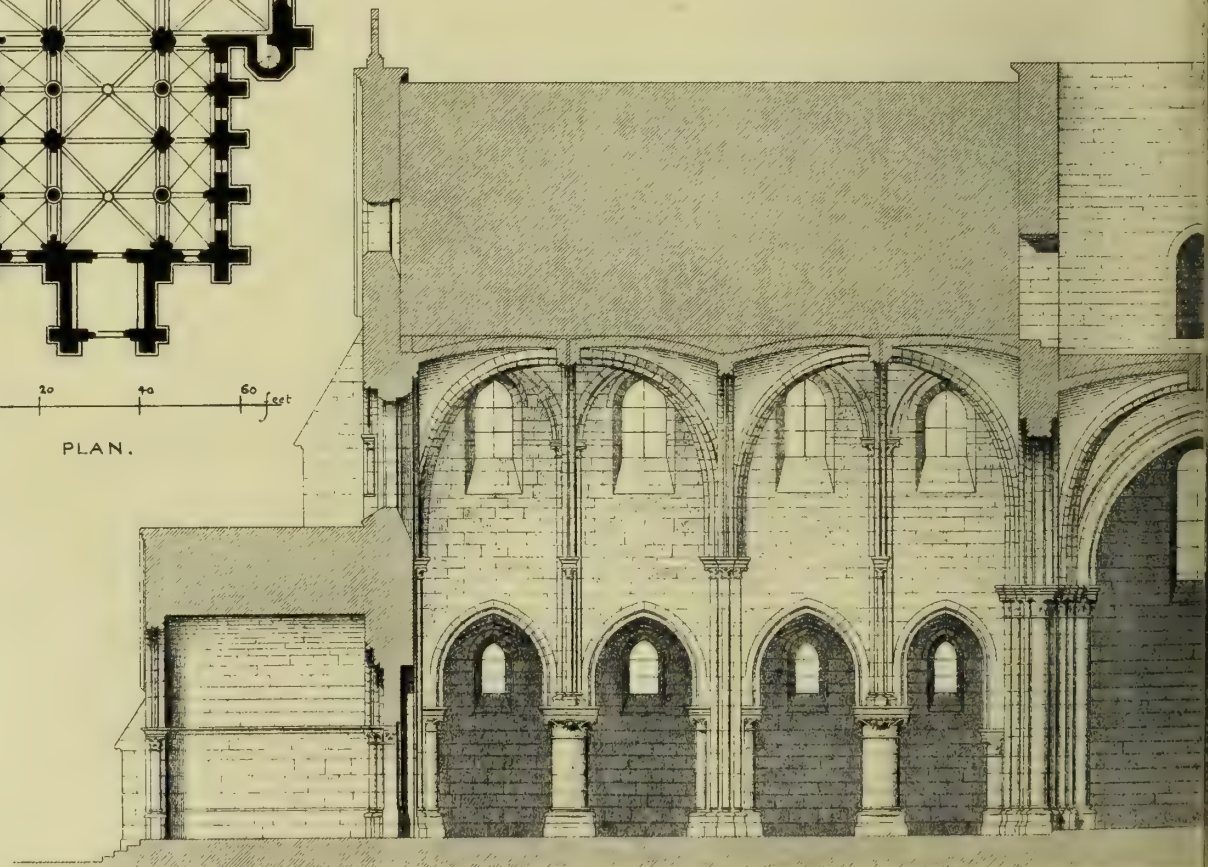
CHURCH AT ANGICOURT  
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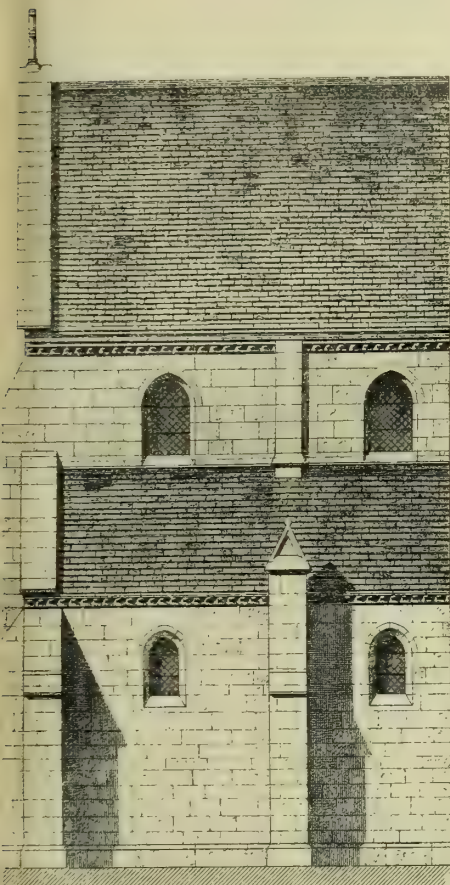
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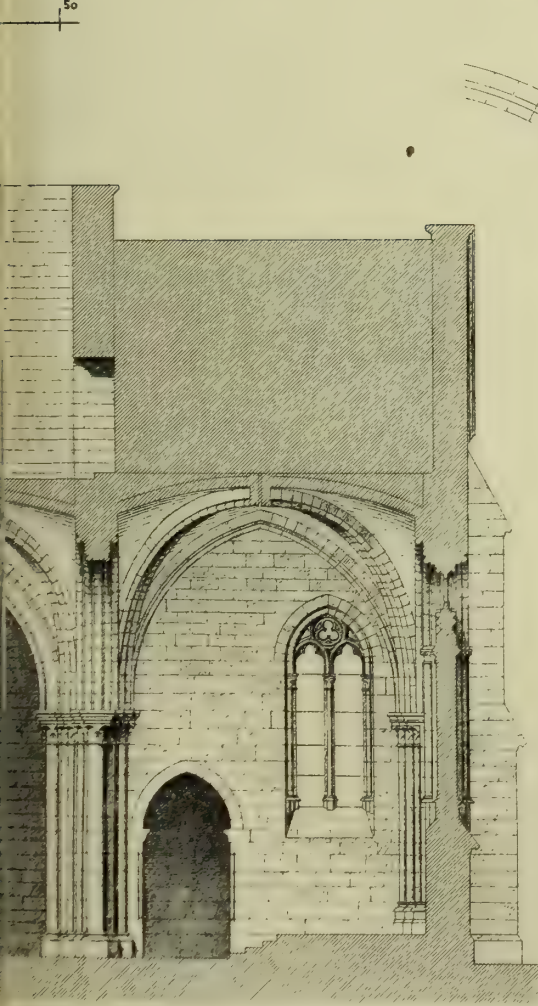
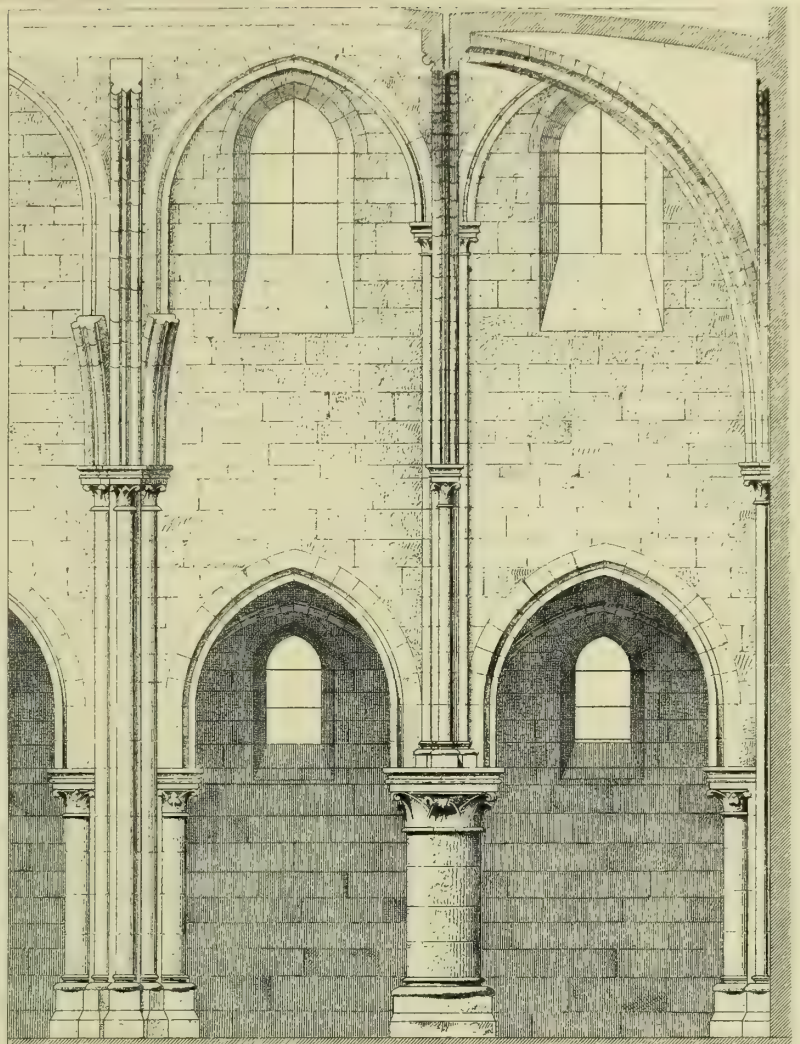
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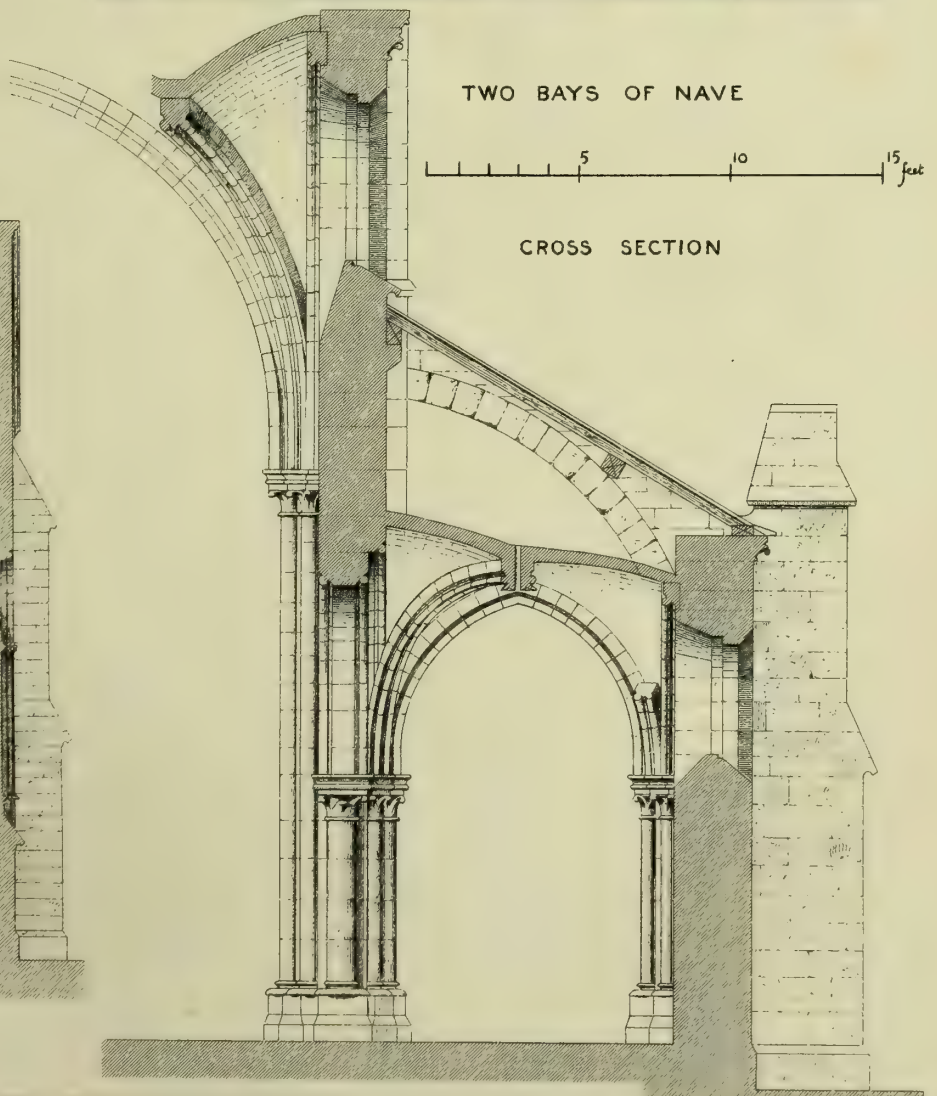




· SIDE ·



50 FEET



TWO BAYS OF NAVE

CROSS SECTION

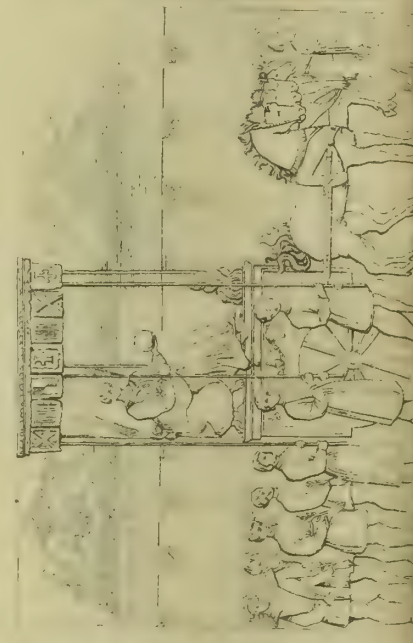
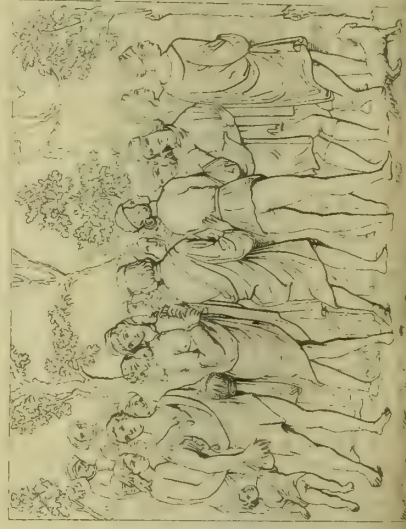
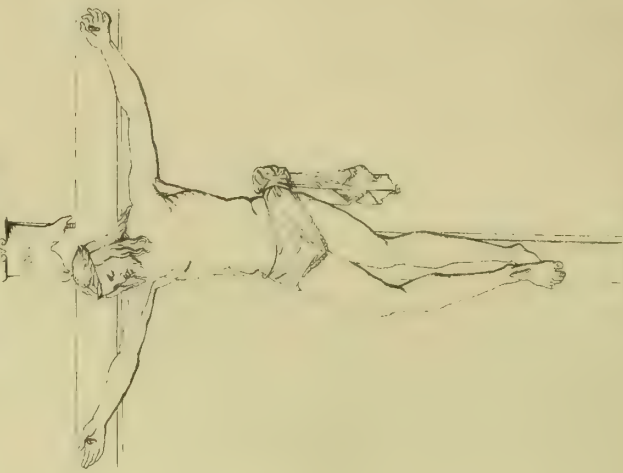
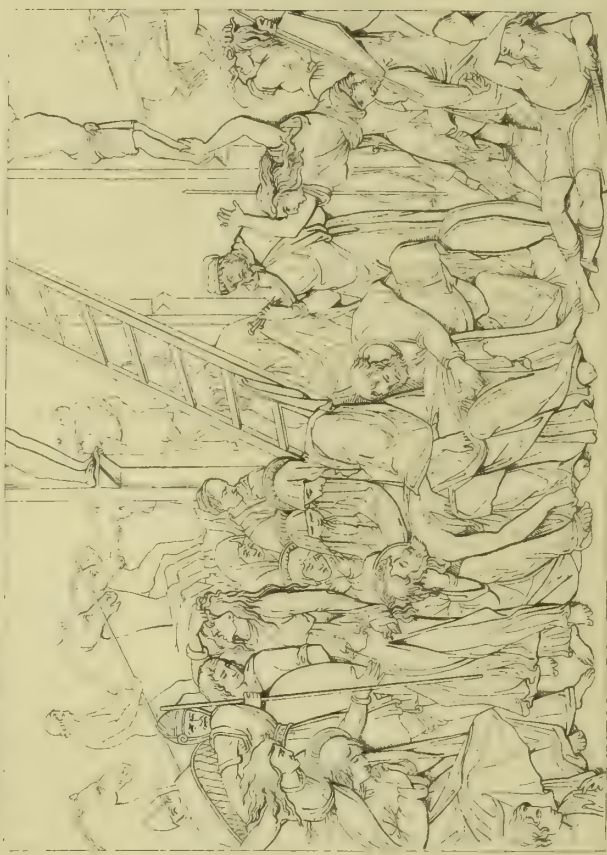
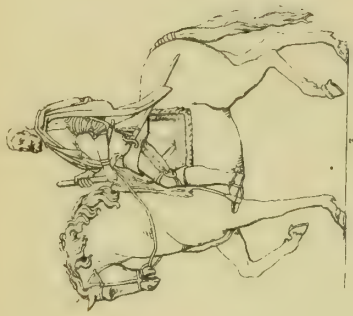




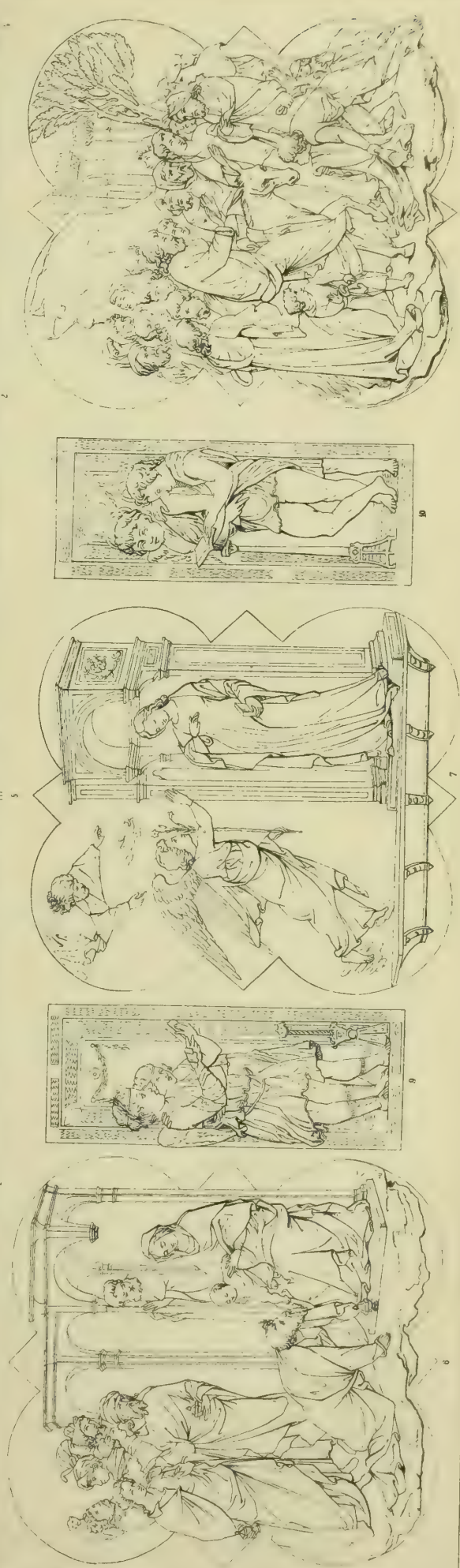
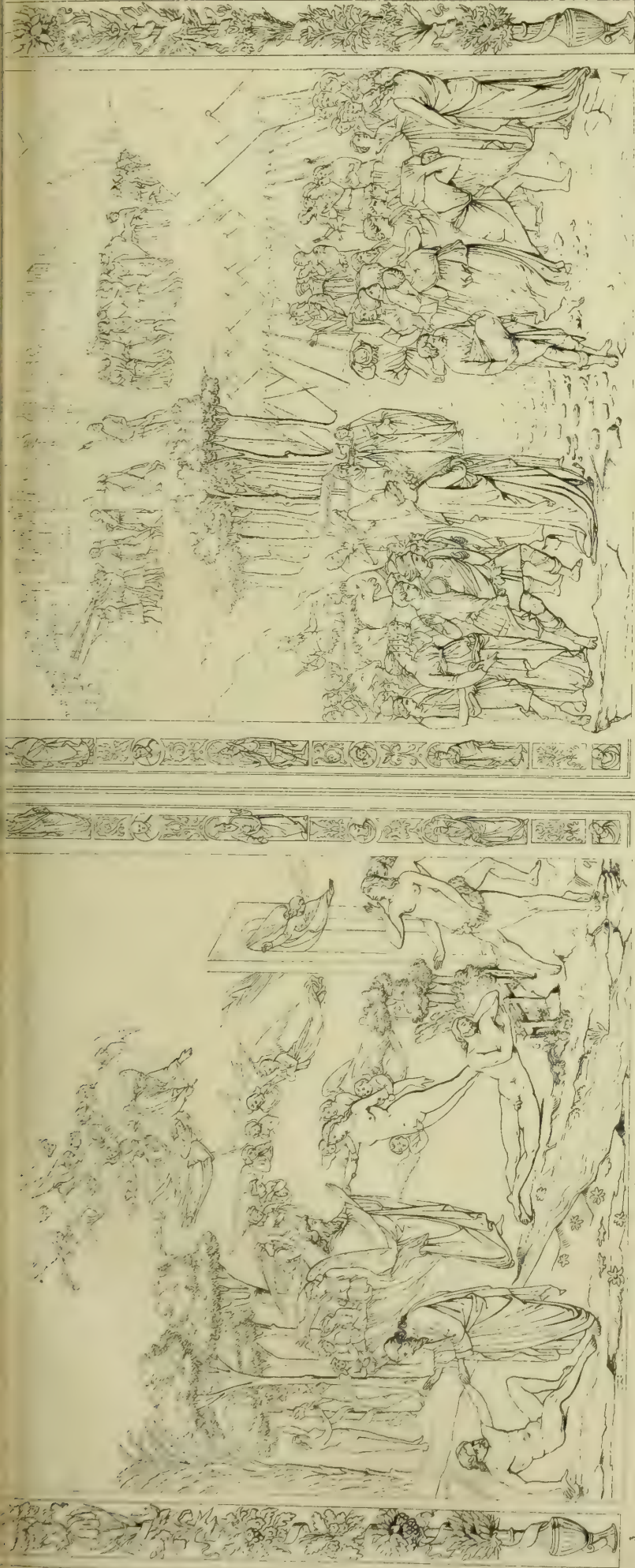












ITALIAN SCULPTURE XVII<sup>TH</sup> CENTURY.

Photo lithographed & Printed by James Akerman 21, Abchurch Lane, London, W.C.

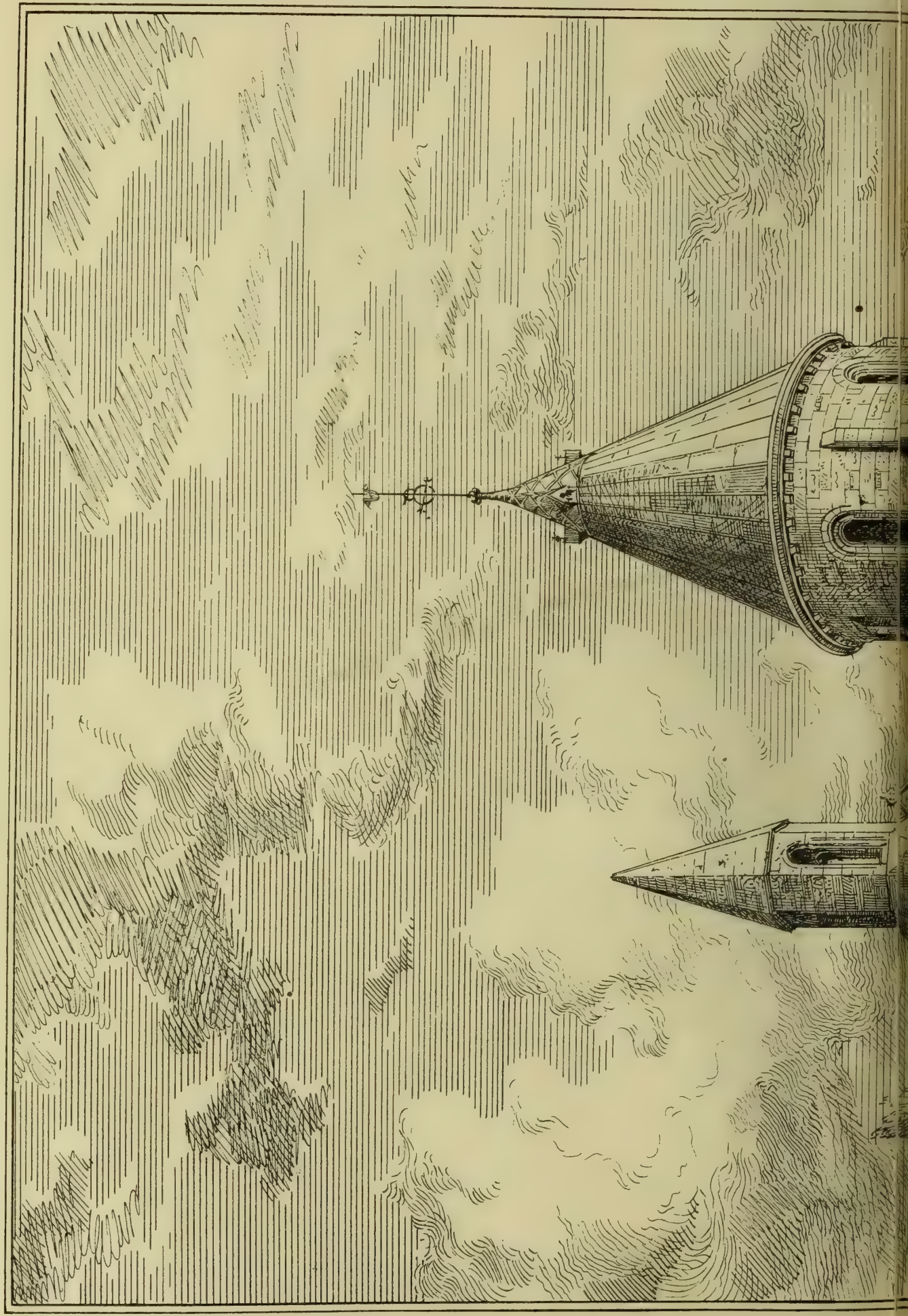




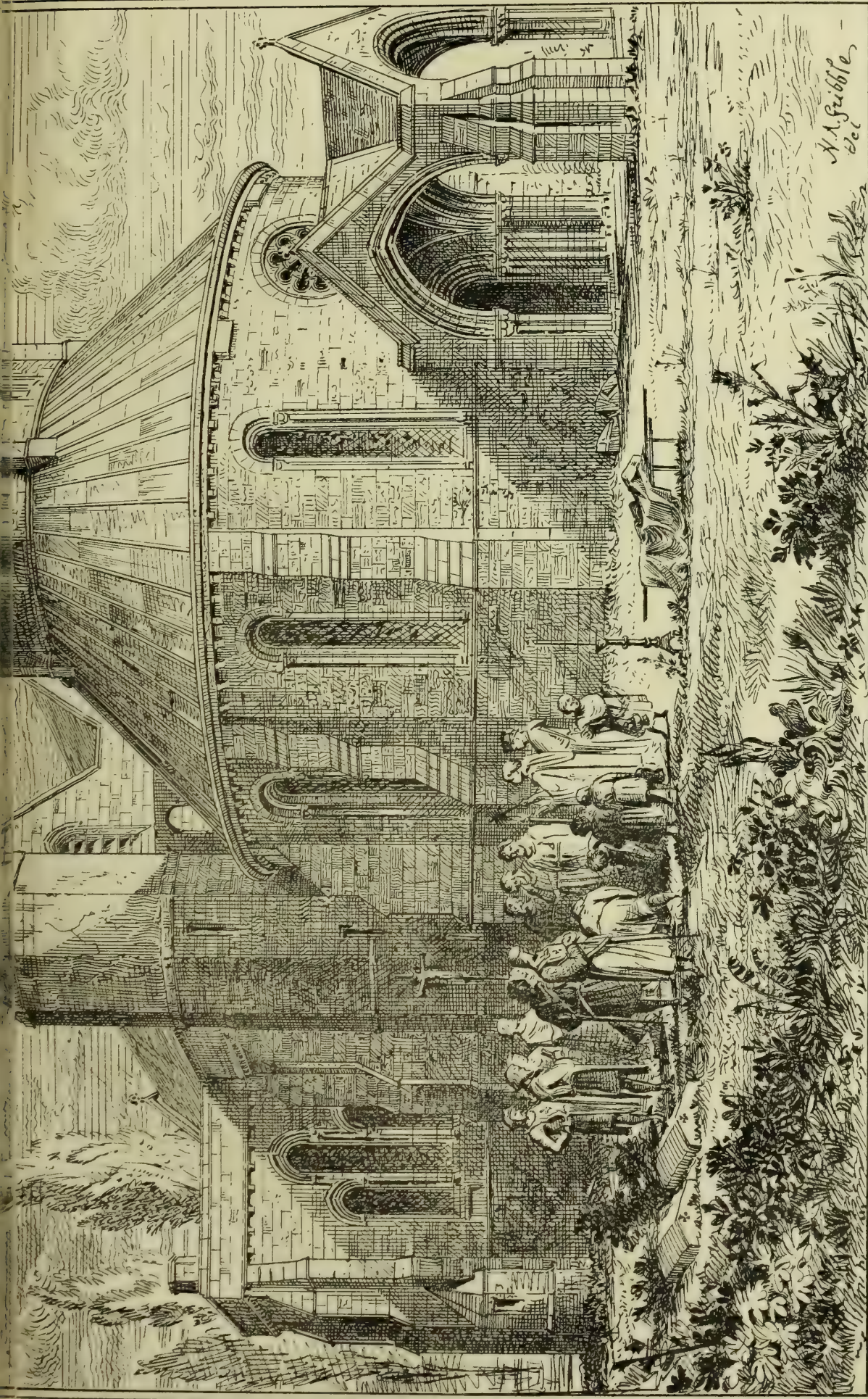






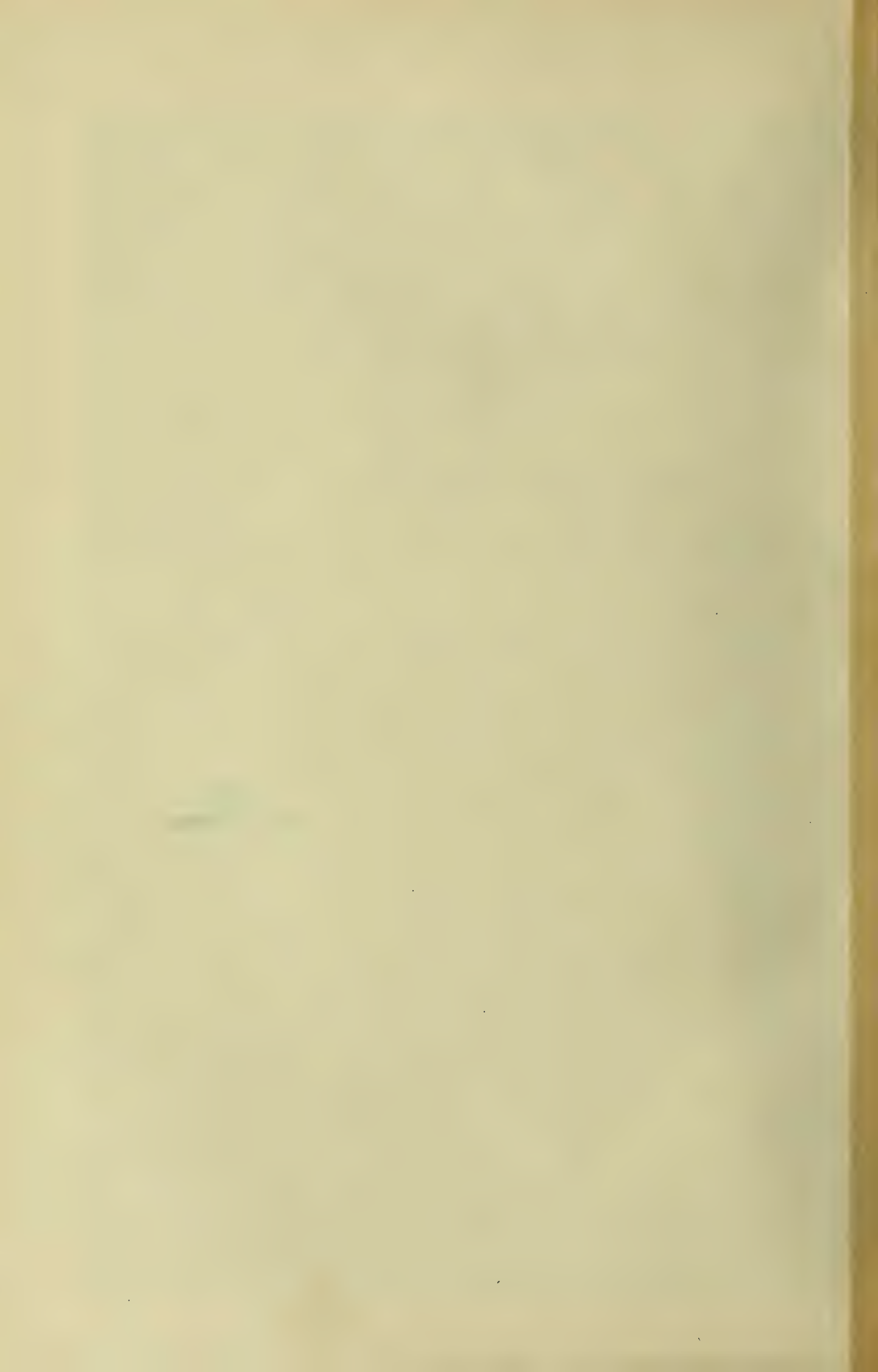






The Temple Church.

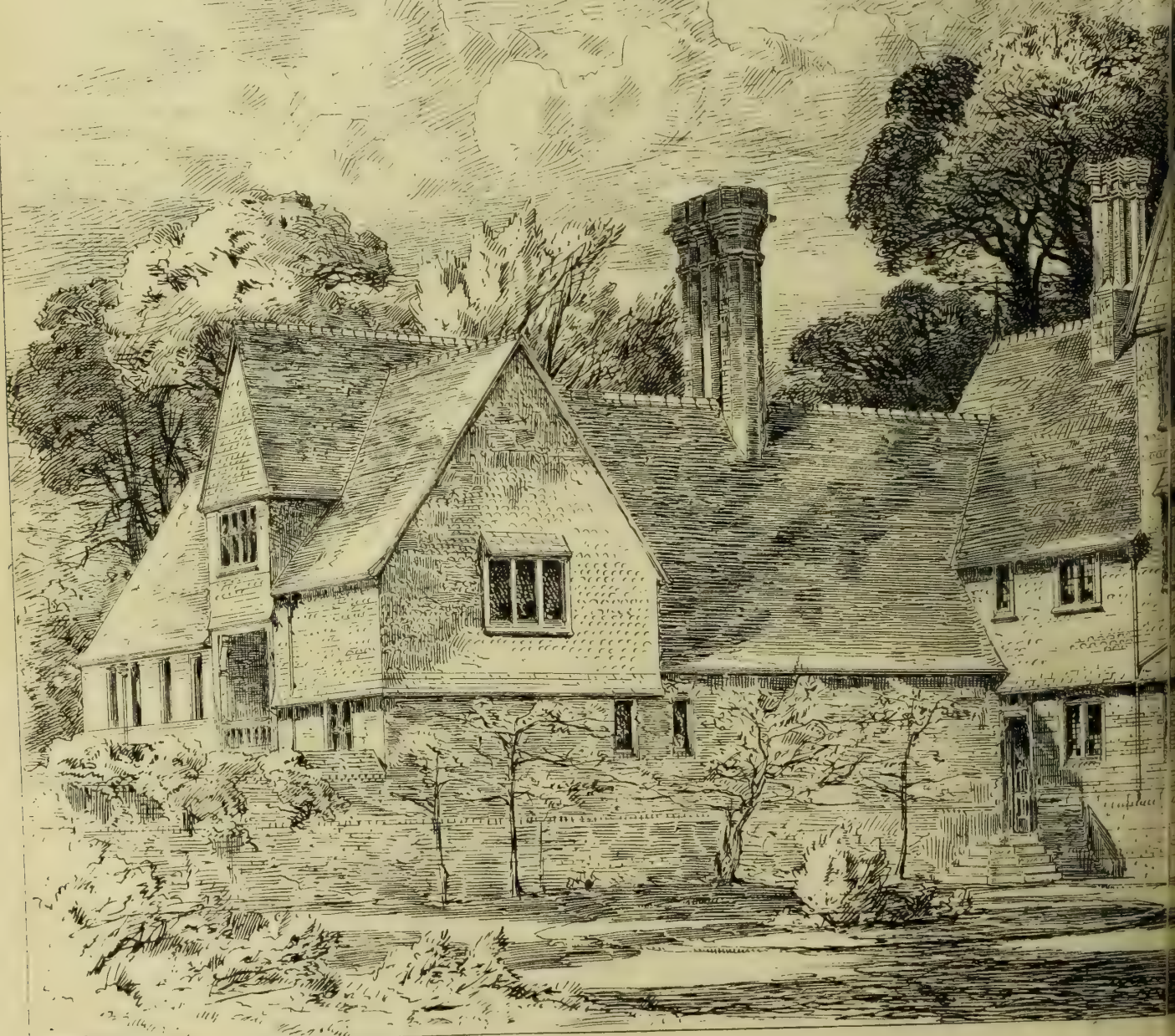












BEAUVALE, NOTTINGHAMSHIRE, BUILT BY

EDWARD W. GODWIN



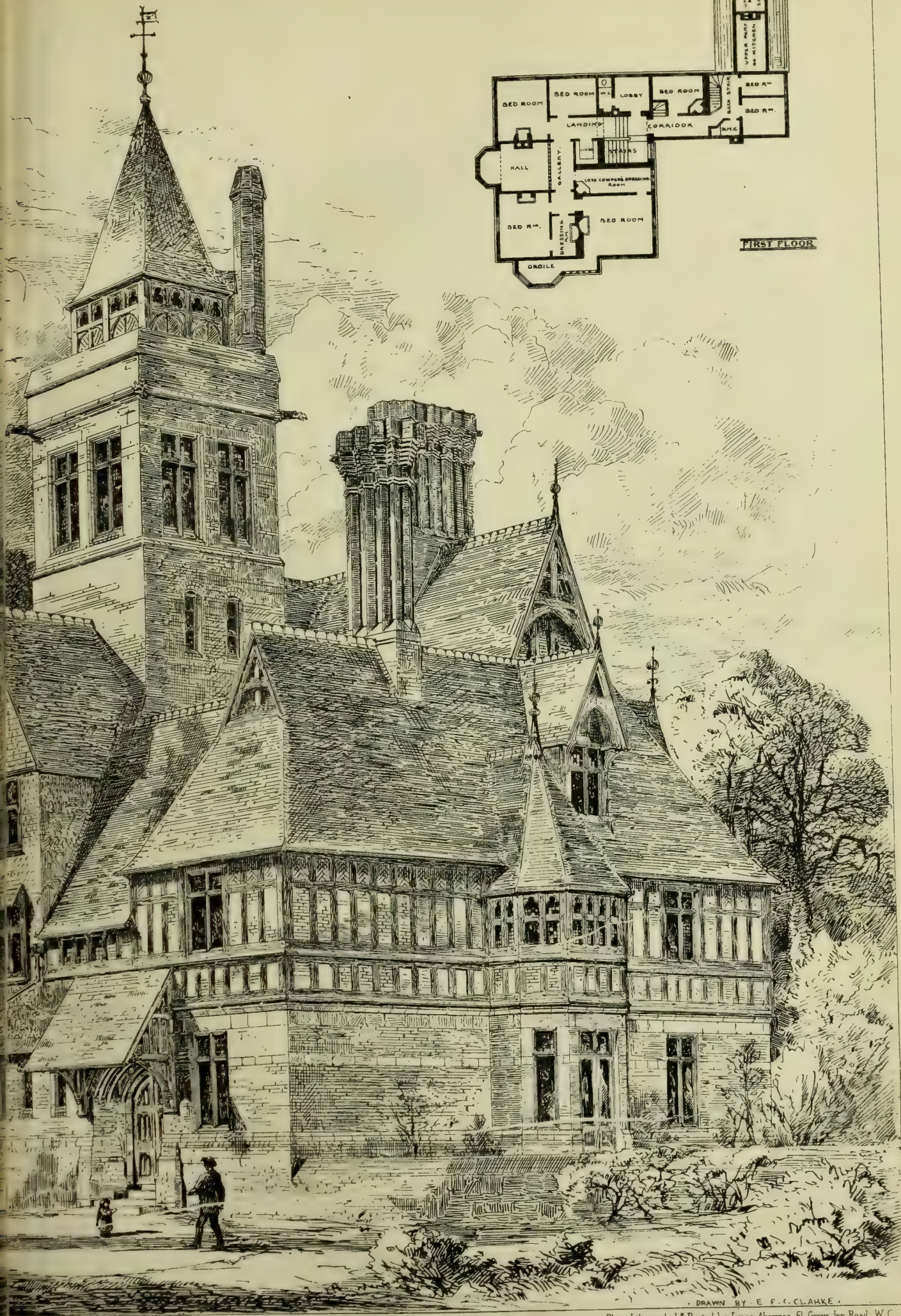


Photo Lithographed & Printed by James Akerman 51 Grays Inn Road W.C.

THE RIGHT HONBLE THE EARL COWPER. K.G.

F. A. ARCHITECT.







## THE BUILDING NEWS.

LONDON, FRIDAY, JULY 10, 1874.

## WORKS OF THE LATE OWEN JONES.

IT is a grateful compliment to the memory and talents of an artist like Owen Jones that his works and designs should be publicly exhibited, and the International Exhibition offered a fitting place and occasion for the display. The recognition of the merits of such works cannot fail to exercise a beneficial influence at a time when mannerism is taken for style, and extravagance and exuberance for correct taste. One characteristic seems to prevail over all Owen Jones's compositions, both in form and colour, and that is, an absence of capriciousness or petty individuality. If we look at one of his carpets, or wall papers, or ceilings, as any of those lent by Messrs. Jeffery or Jackson and Graham, the eye does not weary or get confused by a bewildering profusion of diverse forms, bright colours, and harsh contrasts, nor is the mind distracted by meaningless forms and patterns. Instead of bouquets, and bouquets entwined along trellises, animals and birds in Arcadian profusion, as if roses never tired, there is always breadth and a generalised conception of form and colour. The eye is entranced by a rich simplicity, sparkling vivid forms, all in strict keeping, and a sombre blending of colour. Looking over the sixty-six pattern-carpet contributed by Messrs. Jackson and Graham, we find a diversity of pattern and colour sufficient to satisfy the most opposite tastes. We have the large interlaced rectilinear forms so resembling the rich arabesques of the Moors; the small, delicate convolution, or the jewel-like sparkle of intermingled patterns upon which the eye can wander and revel, but never tire. Flowing wreaths, scrolls, and curved meaningless lines are seldom seen. Richness with this master of decorative art did not mean filagree or Rococo scrollwork, as so many of our decorative "artists" imagine, but something that the eye and mind could dwell upon. Here we have a labyrinthine pattern, the intricacies of which the mind seeks to unravel, or there a puzzle of geometrical form upon which our interest centres. But let us glance at some of the works here brought before us. A large portion of the wall space is devoted to drawings showing the decorations of the Great Exhibition, the Crystal Palace, Sydenham, and a design for the Muswell Hill Palace. These kinds of structure—so conspicuous a development of our enterprise and national art—appeared to have a peculiar charm for Mr. Owen Jones. Although iron and glass were new and untried materials of which our architects and decorators were almost afraid, in the hands of the late Mr. Jones these rich products of our country's mineral wealth were transformed into sparkling forms irradiated with the varied hues of the rainbow. In the design for the decoration of the 1851 Exhibition (No. 11) as submitted to the Commissioners, we see how closely Mr. Jones adhered to his original intentions in the actual decoration of the palace. While we have the octagonal columns of chocolate, blue, and white, the ribs of roof are mainly blue on the sides, relieved by stripes of white at the edges, the underside flange being of red, while the main ribs have white soffits bordered with buff, the sides being blue with white edge. In the Sydenham Palace (No. 7), we have much the same contrast or gradation of colour, the law that the general tints or grounds should be negative, or low in tone, and the primary colours, or white, used only in small quantities, to enhance the tertiary

hues and geometrical lines, being strictly observed. In both cases the ribs of vault are of blue, relieved by white stripes and red edges, the blue preponderating, while in the columns the chocolate or red is the predominating colour, relieved only by yellow, blue, and white caps.

In (No. 13) an interior view of the London Crystal Palace Bazaar, Oxford-street, we have a clever design for a glass roof; the ribs are crossed at an angle of 60°, forming triangular patterns of glass, the pervading centre-tint being yellow, with blue borders and red angles, and the effect is extremely good. Again, we have shafts below gallery of deep red, or marone, those above being blue and buff, alternating with blue and white caps.

In (No. 16), "Proposed Design for S. George's Hall, Liverpool," is shown one of the author's earlier attempts at a monumental kind of design, which subsequently he abandoned. It is a heavily-corniced oblong structure, relieved by semi-circular windows; in the frieze runs the inscription, "Freedom of Debate, Political, Scientific, and Moral." (17) shows a view of the "Exhibition Building, Manchester," evidencing the boldness and originality of the designer. It is a semi-circular roof of glass springing from the ground; the ends have bold red brick gables, with arched recesses and entrances; the internal ribs are in couples of the open lattice design, the passage-way occupying the space between the outer and inner strings of rib. The "Decoration for a Church, at Knightsbridge" (18) is interesting as affording an idea of the probable way Owen Jones would have decorated S. Paul's had he been consulted. This is a Romanesque interior, and we have the shafts of deep red or marone: capitals white, blue, and little red; soffits of arches relieved by red, blue, and gilding, white on faces; spandrels red, with blue medallions and yellow borderings; clerestory, buff wall-spaces and blue edgings to windows; blue frieze and white lettering. Apse has a blue vault, spangled with stars; the wall-spaces are of gold, red, and blue, with deep chocolate dado. Of the visitors to Owen Jones's collection, probably few will not stop to look and wonder at the rough and unfinished sketches from which the splendid work on the Alhambra was developed. The drawings are interesting as showing a true artist's method of delineating and filling in detail. The "View of the Alcove in the Hall of the Two Sisters," showing the colouring restored, and that of the "Hall of Justice" (37), with the "Entrance to the Court of the Lions," give some idea of the splendour of the palace of the Moorish Conquerors. From Nos. 40 to 58 we have a series of finished drawings showing the "Decorations for the Viceroy's Palace at Cairo." The wall, dado, frieze, cove and ceiling decorations, of the most elegant, varied, and rich colouring, are evidence of the facile pencil and power of delineating form of all conceivable complexities, and the delicate sense of colour which so eminently distinguished Mr. Jones's work; and this series, and the drawings representing the decorations and furniture designed for Mr. Alfred Morrison's house, 16, Carlton House Terrace, are alone well worth the visit and study of all decorative designers who desire to raise their art above the mediocre level of ordinary decorative upholstery and cabinetmaking. These last designs and drawings were exhibited at Vienna, and display the versatile talent of their designer. The cabinet inlays, tables, couches, chimney-pieces, chairs, are generally in exquisite keeping in a semi-Moresco style, and many of the executed designs by Messrs. Jackson and Graham are not only perfect specimens of decorative, but of the manufacturer's art. A classic chasteness pervades the outline and construction as also the ornamentation. The furniture and decoration designed for Mr. J. Mason, Mr. J. Gurney, and other patrons, are too numerous to mention, but show the eagerness with which the artist's

designs were sought. We would especially call attention to the ceiling and carpet designs for Mr. Morrison's house. The drawings and original designs for S. James's Hall, showing details of the ceiling to full size, are interesting as further evidence of the consistent following of fixed principles of art which so conspicuously places Owen Jones above so many of his contemporaries. He seems to have been one of those few artists who claim to rank as philosophic. The same canons of colouring are seen illustrated in the roof of S. James's Hall (121), and the colouring proposed for the S. Pancras Station of the Midland Railway (145); the larger surfaces and panels of vault and ribs are blue, and the eye is not distracted by a dazzling multiplicity of strong colours so often seen. In all the designs for ceilings here exhibited an avoidance of bizarre effects is particularly observable; for instance, in No. 5, we are shown a ceiling in which white surfaces predominate; blue ornamentation picked out in white, just touched with red, mark the intersecting ribs and centre of panels.

In the designs for the "Palace at Muswell Hill," which is shown in half a dozen large coloured drawings, the author's capabilities as an artist of outline are seen. The design, which is of iron and glass, shows a parallelogram in plan flanked at corners, and at the four angles of transept crossing with square towers crowned by domes of ogee form, the main centre having a low dome of grand proportions at crossing. The drawings are boldly coloured.

The design for the "S. Pancras Station of the Midland Railway," proposed in competition (143), is in the Italian style, and is interesting as affording a contrast to the more palatial-looking executed building of Sir Gilbert Scott's. The roof designed by Mr. W. Barlow, C.E., is decorated upon the same principles as that of the Crystal Palace.

Other works deserve a passing tribute. Among these are the "Specimens of Furniture Silks" (181), exhibited by Messrs. Warner and Ranum, and the cases of "Curtain Materials" (182), exhibited by Messrs. Jackson and Graham. "Specimens of Decorative Wall Papers" (183) and the "Pattern Carpets" already alluded to, from the same manufacturers, and those exhibited by Messrs. Jeffery and Co., are fine examples of decorative art applied to woven fabrics and paperings. We would especially mention the fine Axminster (Indian) carpet contributed to this collection by Messrs. Lewis, Halifax. The arabesque pattern and the predominating green and blue colours, relieved slightly by red, yellow, and white, go to make up as perfect an example of carpet design and colouring as we can desire. The ground is of retiring and negative colour, without strong contrast, and the decorative forms, flat without relief, give an excellent illustration of the principles of carpet design.

The "Victoria Psalter," Thomas Moore's, "Paradise and the Peri," down to the "Wrappers for Biscuits" designed for Huntley and Palmer, show the diverse applications to which Owen Jones put his art. Messrs. De la Rue and Co. exhibit also "Book Covers," "Playing Cards," and various *et ceteras* of their manufacture which have received the touch of his magic pencil. But we cannot particularise further. Though an elaborate ornamentist, Owen Jones cared for and studied mass and outline as much as ornamentation. His designs, inexplicable and ramified as they are, are all clear as crystal; no confused jumble or bizarre effects are seen; his colours are also, though blended to secondary and tertiary hues, relieved by white and primaries to a consummate perfection. One or two lessons may be drawn from this collection of drawings and works of art. First, the manner of working of a true artist. All the sketches and drawings indicate the process of his mind and the principle of his success. He designed the forms and constructional lines of his work



with great care; the complex and intricate patterns we see are all conceived in mass and outline, and are filled in, never allowed to become the pervading key-note or principle. Second, Colour, in large masses and surfaces, was employed in negative and tertiary hues, the smaller detail and forms being relieved by brighter colours. Third, All pettiness, conceit, and individuality were lost in the grand aim and object of his work; his art proceeded upon the *subjective* method of giving the generalised result, and not the individual particulars. There was no mannerism, nor pre-Raphaelitism. A Moresque feeling pervades all his designs, though his combination of form and colour are all tempered with a classical spirit and correctness.

In conclusion, we recommend all our readers who have not seen the collection to avail themselves of a visit. The object the Committee have in view, namely, the perpetuation and recognition of the services of Owen Jones, by means of some form of memorial, is a commendable one. The idea of a scholarship would be most desirable, and, we think the most fitting recognition of this artist's life and principles. Owen Jones was, *par excellence*, a teacher, and no mere bust, statue, or portrait could perpetuate those principles to which he devoted his life so well as the foundation of a college or a training in Art.

#### HEAT, AND ITS RELATION TO CONSTRUCTION.—II.

HAVING shown the value of encasing iron-work as a means of obviating the inconvenience and danger arising from the action of heat or rapid changes of temperature, we will here throw out a hint or two which will be of service to the architect and engineer who may be seeking for some simple method of covering iron columns, &c. Let circular, octagonal, or other hollow bricks (depending on the section of the iron to be encased) be moulded to surround the iron column or core, with a sufficient space of air between the two, which space may be readily obtained by placing vertical fillets of wood against the column of iron, and fitting the encasing bricks to them. A good fixing is thus secured, and the brick cylinder may be left as a facing, or rendered in cement or plaster, as may be desired. In the latter case, a better plan would be to encase the iron column with perforated brick or earthenware tubes of the form required, the joints being rebated or fitted together by slight flanges. The perforations would form a key to the plaster or cement face, and an excellent fire-resisting protection, thoroughly non-conductive, would be given to the iron. The air space could be filled in with plaster or packed with felt. We think the above suggestion a valuable one, as its extreme simplicity and its facilities for architectural treatment are evident. The tiles or tubes may be moulded, fluted, or ribbed, as desired. Terra-cotta would lend itself admirably to the purpose, and would be far better than the terra-cotta being simply filled with concrete, as we should retain the great advantage of an iron core sufficient to carry the weight imposed with a covering at once fireproof, non-conductive, and not open to the objection of condensing moisture, which unprotected iron is.

Another important illustration of the effects of heat on metallic structures may be instanced. Iron roofs and domes have been known to be seriously deranged by the unequal expansion due to the sun; rafters and ribs in long lengths frequently warp, and bend or push out of line the ridge, break screws and joints, and otherwise throw out of gear the entire trussing. In long and wide station-roofs these effects of unequal expansion are chiefly rendered harmless by the elasticity of the opposite parts of the numerous joints. The heat being externally applied to long rafters

and ribs tends to expand their outer parts more than the internal, and hence the effect of the elongation would be to make the roof bulge upwards, or give an arched form to these parts, and the only serious strain this mode of action would create would be an upward one, drawing the tie-rods, and probably snapping the bolts in weak joints. In high shafts or towers of iron the effect would be to make the structure incline from the heated or sunny side towards the opposite side; and, in lofty towers, this would be considerable, unless sufficient means, as packings of soft substances, intervened at the beds and joints. A notable instance of this movement—due to unequal expansion—is noticed in the iron dome of the Capitol at Washington. The figure at the summit is found—on good authority, by means of a plummet—to oscillate backwards and forwards as the sun's influence travels from east to west. In the morning the statue or plummet suspended has a movement of about 2½ in. towards the west, and in the afternoon an equal movement to the east, or a total distance of 4½ in. is traversed; the afternoon expansion, however, has a less influence than that in the morning, as a considerable amount of heat is retained on the easterly half, which somewhat equalises the effect. It will be observed, also, that during the winter or cold weather a contraction of a like degree takes place, i.e., the unequal expansion during the hot weather is about equivalent to the unequal contraction during the cold, and therefore the real amount of strain induced may be regarded as about the same.

To obviate these effects, which must in course of time considerably lessen the stability of structures rigidly framed and tied together, the architect should take every means in his power to reduce the active effect of inequality of the temperature. Roofs and domical structures of iron should be always covered with felt or be protected on their outer surfaces at least by cappings of some material which will counteract all sudden changes of temperature, and thereby help in equalising the effect of the sun. Similar casings, as we have suggested, for internal ironwork could be employed without sacrificing the rigidity and value of iron as a material, and, at the same time, give that amount of substance to iron structures which at present they sadly lack, and which places them in the unenviable position of temporary or makeshift erections of the ordinary railway-shed type. Sometimes, however, the employment of iron would be expensive if such means of covering were resorted to. For instance, in iron railings, balustradings, and the like, where yards, if not miles, are used, it would be practically impossible to apply any casing, and therefore we must have recourse to the jointings of the ironwork. In the case of railings, the horizontal rails should be allowed free room for expansion at their ends at every standard or upright, the ends being brought together in a long socket or tube of cast or wrought iron, allowing the ends a certain space between for expansion; the standards or uprights would pass through the centre of these sockets, the latter being drilled to receive them; or a simpler plan is to lap the rails at the standards, the hole for the latter being rather elongated like a slot, so that the rails would be free to act without pushing the standards out of the vertical. We have, in designing great lengths of iron fencing, adopted the latter plan, which entails no extra expense, and prevents the railing from bending and unduly straining the standards—a defect often noticed; indeed, we have seen standards pushed out of the upright by want of precaution in not providing for this expansion of metal. In cast-metal balustrading—as that along the sides of Blackfriars Bridge—where there are no standards, the above method could not be adopted so well; and in such a case it becomes necessary to allow free play at

the extreme ends where they finish against the masonry or piers. We doubt very much, however, whether in the instance mentioned such precaution has been taken, seeing the uneven and compressed appearance at some of the close joints. In such cases, however, unless the joints are covered, it is impossible to make them very close in appearance.

Cast iron, under the influence of intense cold or frost, becomes extremely brittle, and even wrought iron loses its malleability. The use of cast-iron as a structural material, unless protected as described, should be avoided where it may be exposed to great variations of temperature. Castings should be equally proportioned, or they will be liable to break upon unequal contraction. In complex patterns breaks should be provided for this.

Variations of temperature not only affect the volume of bodies, but materially promote their disintegration, as in the case of stone. Thus frost exercises a marked influence upon the structure of materials: while it contracts the material it expands any contained water, and gradually disintegrates in this way all porous stone and timber.

It must not be supposed that other materials than iron are exempt from the unequal effects of heat and cold. Architects and builders generally ignore, or practically disregard, these unequal effects; but as to stone, brick, glass, and even plaster and wood, the question of dilation or contraction is not thought of, if suspected. Thus we see stone balustrades of great length, as the granite parapet wall of the Thames Embankment, put together with close joints, and often without any free play at the ends, as if there was no increase of volume. Fortunately the linear expansion of granite and stone is small, being nearly one part in about 1,200 from 32° to 212°; still, however, it exists as a force, and when we consider the close beds and joints which are almost incompressible, having only grains of silica between, splitting or dislocation must ensue when it is heated by the sun. We see also stone steps, cornices, and string-courses of great length, jointed so closely and imperfectly that it is evident the builders or masons considered only continuity, and nothing else, ignorant of the action of a force which would shatter and crush the hardest granite. All such stonework expands by the heat of the sun, and it is not uncommon to find walls and steps out of line, or the joints and beds fractured from this cause. We have before shown the impropriety of architects specifying long lengths of stones for mullions, shafts, architraves, &c., so as to have few joints, and this, too, in brick or rubble walling. But, besides the evil of unequal settlement, we have the expanding property of heat to consider, which make these parts upheaving agents, or, in the ordinary course of things, they yield or fracture and split at the joints and beds. How frequently we have seen mullions, shafts, and other stonework splintered at the joints from this one cause, but which is often placed to the credit of that all-prevailing source of mischief, a "bad foundation." The early Gothic masons, whom we are so prone to copy, give us in their work frequent bed joints, and we have seen mullions and shafts in which the stones were coursed with the rubble at varying heights of about 9 in., the mortar joints being of a certain thickness. Sir Christopher Wren, in the Cathedral of St. Paul's, has shown his constructive and scientific skill even here. The joints and beds are thick, and many masons would say coarse; but this is no excuse for marble veneer, which, by the way, is still more exposed to this effect of heat than stone.

Lead and zinc coverings are affected to a far greater extent by heat than iron, the linear elongation being more than double. Hence the necessity of laying these materials without solder or nail-fixing by allowing the



sheets to clip each other at the edges, or by having roll or cap joints, so as to give free play. We have frequently seen sheets laid on the old system torn or puckered to such an extent that the currents have been diverted from their proper channels. The system of laying zinc advocated by the Vieille Montagne Company is to be recommended in all cases. Metal cramps and dowels, when too closely or rigidly fixed in stonework, frequently burst the stones, showing the advantage of employing other materials for such purposes.

Even wood, though it varies less in volume than any building material, is not free from the action of heat. Under the sun's rays the fibres undergo torsion, though the actual expansion is very small. We conclude our present remarks by giving the linear expansion of ordinary building materials, subject to a change of temperature from 32° to 212°:—

Zinc . . . . .	one part in	322
Lead . . . . .	" "	349
Tin . . . . .	" "	403
Copper . . . . .	" "	581
Brass . . . . .	" "	584
Iron, wrought . . . . .	" "	846
" cast . . . . .	" "	901
Slate . . . . .	" "	964
Flint-glass . . . . .	" "	1248
Granite . . . . .	" "	1267
Brick . . . . .	" "	1818
Roman Cement . . . . .	" "	697
Deal . . . . .	" "	2450

In further remarks we will show some other effects of heat in construction; in the meantime we hope we have shown the importance of combining metals with other materials under due caution, and the necessity of duly proportioning masses of metal and stone in structures, though it is a subject that has been very inadequately dealt with by writers on construction.

## SCHOOL ARCHITECTURE AND PLANNING.\*

### FIRST NOTICE.

**E**DUCATION has received such an impetus by the Elementary Education Act introduced by Mr. Forster in 1870, and still more by the knowledge of the rival systems of education of other countries, which may be said to have almost surpassed our boasted supremacy, that school authorities and architects have been compelled to look about, and keep their eyes open as to what is being done by their Continental neighbours and Transatlantic brethren. The School Boards which have arisen under the new Act, the compulsory attendance of children over a certain age, and the inadequate accommodation provided by the old schoolhouses, have awakened the public, and through it the architects, to a sense of our deficiency in school-planning. The movement has at least done one thing. It has shown us that a system of tuition and school-planning are inseparably connected, and that no improved method of education can be left to imperfect methods of construction and sanitary conditions. It has been too much the custom among architects to regard the school-house like the church, as an inviolate ground, with which the schoolmaster had little to do. A gabled projection or two, with lancet or traceried windows, a bell gable, and a few projecting exterior chimney-shafts, buttresses, and pleasing grouping, were pretty much all the ordinary architect of our national schools thought about. The "rules" of the Department of Privy Council on Education controlled somewhat the vagaries and irregularities of school architects as regards plan whenever school promoters and begging clergymen lacked funds, and in some of these cases the

rigid necessity of economy and the enforcement of certain rules have combined to keep architects a little more in a proper groove. Compulsory rules or "regulation plans," however, have on the other hand interfered with a due regard to improvement; have sometimes failed to meet special wants; and, more especially, have hindered original thought and ingenuity in the development of school construction. Under these circumstances, the new School Boards have not arisen too soon. The Elementary Education Act has created a healthful discussion of the subject, and has provoked a good deal of thought and effort that cannot fail to be of service.

Mr. Robson has produced a work which indicates at least a favourable attempt in this direction, and shows the amount of valuable material the school architect has before him. In a volume of over 400 pp., we have seven chapters set apart on the existing schools of our own and other countries, America, France, Germany, and Austria, besides eleven other chapters treating on the theory of English elementary schools, graded schools, middle and industrial, and various practical details connected with the subject. As we have so recently given a series of articles by Mr. Robson himself, embracing the earlier portions of this lately published book, we will in this and following notices confine ourselves to the practical bearings of school planning, and those details of which the author has treated in the concluding part of his work.

It has been too much the fashion of educationists and reformers to laud the systems and works of other nations, to the disparagement of our own, forgetting the fact that every country has its own special wants and peculiarities, and that a system which has been centuries in course of development must at least possess its good as well as imperfect points. Thus, our present school system and planning has been one of evolution. The large wide Lancasterian school, and the narrower room with classrooms of the Education Department, are steps, and show a wide experience.

The systems of other countries may help us in certain points of detail which we have latterly availed ourselves of, and if we are tending towards any one system we think it is the Prussian, as Mr. T. Roger Smith hinted in his recent paper, and of which system he has given us a good example at Stepney. But on the whole we think our system for elementary schools must be fundamentally based upon the pupil-teacher organisation, and that the separate class and teacher system of Germany and Scotland must only be partially adopted. In our higher schools, perhaps the separate classroom has more advantages. There is no doubt, however, we shall gradually adopt a larger number of classrooms than it has been our custom. The educational systems of Switzerland and Holland are especially good; the plans are based on the German types, as may be inferred from the number of German teachers employed. The influence of numbers is an element, and we think in all primary schools this influence is important, though we would not advocate a return to the plans of the Bell and Lancaster type.

But reducing the mass of data with which Mr. Robson furnishes us in his comprehensive work, we believe the rules of the Committee of Council on Education, upon which nine-tenths of the existing schools have been built, contain much of the real advantages and merits of all systems. This Committee, which dates from 1840, first developed the pupil-teacher system. To it we owe the arrangement of desks on one side only of the room, partial separation of classes by curtains, and a width of room sufficient for drawing out the classes in front of desks, or 20ft. maximum width; the "sympathy of numbers" is also preserved, while strict regard to economy is enforced. Probably the latter restriction has been injurious in some instances, by adapting principal

schoolrooms to purposes not strictly intended, as we find in many villages and country schools, where it serves the purpose of the village lecture and concert-room, or for tea gatherings; and in this way classrooms have been unduly stinted. Many of our Wesleyan schools, based on Mr. Stow's system, which was the first development of the pupil-teachers' school, are also favourable examples of the compromise between Lancasterian and German models. They are "mixed" schools. The theory of English elementary schools is based essentially upon English methods of conducting education. The pupil-teacher system lies at the very threshold. In England it is very reasonably assumed that the power of teaching is best learnt by means of a regular training or apprenticeship, and hence boys and girls, pupils of a school, who have arrived at the age of fourteen, may be apprenticed for a term of five years, during which time they engage in teaching and in qualifying themselves, by receiving further instruction for the examination necessary to become certificated teachers. Upon this system the Revised Code of the Education Department, which is annually amended, divides schools above the infant stage into six grades or "standards of examination," which commence at the age of 6½ to 7, and correspond to six successive years. It also lays down that the number of children taught by a certificated teacher and one pupil-teacher shall be 60, an additional pupil-teacher being required for every 40 in addition to that number; and either one assistant (certificated) teacher or two pupil-teachers for every 80 additional. The principal teacher of any department is wholly responsible for the management, and is personally engaged in teaching—not, as in some systems, a general superintendent—the pupil-teachers being only aids to the principal teachers. It is thus at once seen that this mode of conducting the work of schools imposes certain rules, as, for instance, the provision of a principal school room, where the assembling of the children takes place at least once a day, under the general supervision of the head-master; and not, as in German and other Continental schools, merely an isolated number of classrooms accessible from a corridor. Yet there can be no doubt a larger number of classrooms than we generally see would considerably promote the work of teaching, by enabling the teacher to concentrate his power in certain classes. So long as the separate-class principle is subordinated to the general supervision by one master, we think it cannot be too strongly advocated.

The largest double-class for a graded school taught by a teacher and pupil-teacher together is 80. Above this number no grants or payments on the results of teaching will be counted. It is, however, only the extreme limit of the Education Department, and the architect may take a smaller number to meet the requirements of his plan, say 60 or 70; for the senior classes the former is considered about the proper number. In Article 17c of the Code it is required that 80 cubic feet of space per child shall be given to the principal schoolroom, this being on the whole number of children.

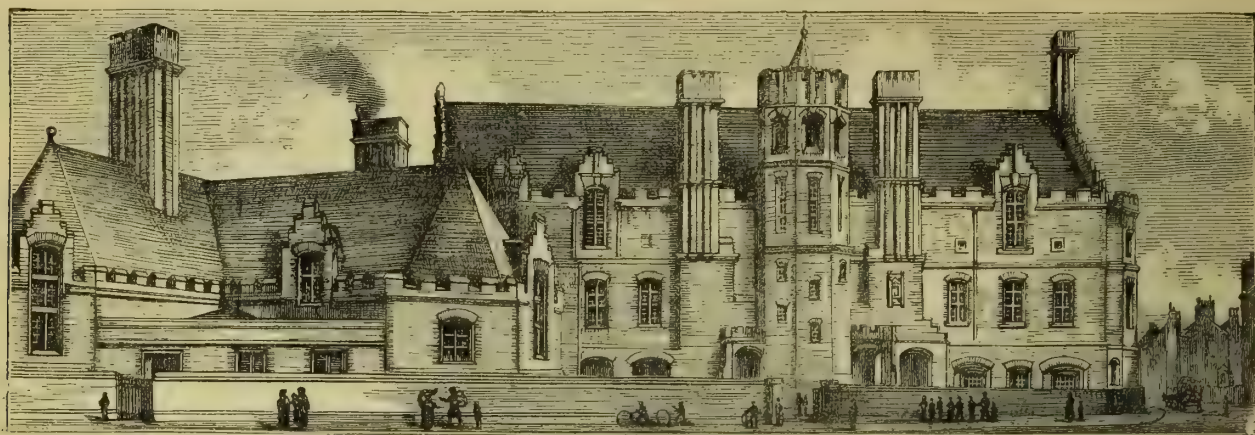
The architect has next to consider the numbers to be allotted to each department. This will vary with locality, mode of separation of departments, and divisions of graded schools: as, for example, the simple separation for boys, girls, and infants, or into "senior" and "junior," mixed, or with separation of sex.

We append the statistics of Government, as to relation of attendance to age in each thousand of the population, which may be useful to our readers:—

Between 3 and 4 years of age . . . . .	111
(From 3½ to 4, say 55.)	
" 4 to 5 " " " " " " " " " "	110
" 5 " 6 " " " " " " " " "	105
" 6 " 7 " " " " " " " " "	103

\* "School Architecture: being Practical Remarks on the Planning, Designing, Building, and Furnishing of Schoolhouses." By EDWARD ROBERT ROBSON, F.R.I.B.A. London: John Murray. 1874.





SOUTH VIEW OF WINSTANLEY ROAD SCHOOL, CLAPHAM.

(From 6 to  $6\frac{1}{2}$ , or  $6\frac{1}{2}$  to 7, say 52.)

Between 7 and 8 years .....	100
„ 8 and 9 „ .....	98
„ 9 and 10 „ .....	96
„ 10 and 11 „ .....	94
„ 11 and 12 „ .....	93
„ 12 and 13 „ .....	90

Taking 3 years of age as the lowest age for infant school, the numbers may be placed as under:—

Infants' Department ..	six fifteenths.
Junior do. ..	five fifteenths.
Senior do. ..	four fifteenths.

In towns, where it is necessary to place one school over the other, the best plan is to divide the school into two equal departments, one for boys, and the other for girls.

A usual and commonly-accepted rule as to classrooms is to provide as many as the schoolroom will accommodate, the desks in the latter being placed as close as possible. A compact arrangement of building is the next consideration. Corridors should be avoided, as wasteful of space, and as interfering with through ventilation. They also necessitate greater labour. Economy of organisation, both in servants' and teachers' staff, must be constantly in view in elementary schools. Various points of construction and arrangement must be also considered, after determining the number of departments required. Among these are position and shape of land; number of stories; position of infants' school; entrances; staircases; side lighting (left hand); warming and ventilation; position of latrines; master's house, &c.

The Code gives 1,200 square yards of land as the least extent of site, under ordinary conditions; and the buildings should be detached. The form of land and adjacent buildings, no less than sun and air, will control primarily the arrangement of the school-house. Some school-builders give as much sun as possible, and others exclude direct rays. Mr. Robson justly says the truth lies somewhere between these extremes. Architects should, in every case, determine the most desirable aspect for the windows; and, we think (unless other conditions interfere), make this the regulating principle in arranging their school-rooms. South or south-west aspects are too sunny in ordinary sites. North or south-east are better; we think the latter is to be preferred in London and dark neighbourhoods, though the author prefers the north as being the coolest, steadiest, and best light, and says the boys' and girls' school-rooms should be as near that quarter as possible.

The question of sun or no sun is, however, less important than the position of the windows in the schoolrooms. The sun's rays can be subdued by blinds, but the relative direction of light admission is all important to both pupils and teacher. We have it on the authority of Dr. Liebreich, the ophthalmic surgeon of S.

Thomas's Hospital, that light "must be sufficiently strong and fall on the table from the left hand side, and as far as possible from above. The children ought to sit straight, and not have the book nearer the eye than ten inches at the least. Besides this, the book ought to be raised  $20^\circ$  degrees for writing, and about  $40^\circ$  for reading." These are important points. Dr. Liebreich attributes disturbed or deranged visual functions during school-life to two causes—improper method of lighting, and improper shape of school desk. These are, 1, decrease in range (short-sightedness) or Myopia. 2, Decrease in acuteness (Amblyopia). 3, Decrease of endurance (Asthenopia). Ill-arranged desks or insufficient light obliges us to lessen the distance between the eye and book while reading. In looking at very near objects, the tension of the muscles of motion of the eye which cause the axes to converge to the object is increased, and this tension in weak eyes creates a disturbance or permanent weakness of the muscles.

In Germany, lighting has received considerable attention, and Dr. Cohn says that of 410 students whom he examined, only one-third possessed good sight. Myopia, or short-sightedness, is prevalent. It is considered that a classroom should have 30 square inches of glass to every square foot of floor space; or that each scholar should have 300 square in. of window glass, allowing 10ft. superficial to each (p. 178, ch. II). Excess of light is better than deficiency, and some of our old schools are very insufficiently lighted. Through ventilation requires opposite windows, and when this is necessary from the want of an efficient system, a compromise between the two modes of placing windows should be adopted.

Next after lighting comes another all-important element in controlling the size and proportions of schoolrooms, viz., the school-desk. The desk question, as Mr. Robson says, should be first decided in planning a school-room. Hitherto, long lengths of desks have been employed, but experience has latterly shown that it entails some disadvantages. If long enough for four, five, or six children, access and egress for both teacher and pupils can only be obtained by longitudinal gangways; it also necessitates, for seating a large number, "so great a length as to limit the class to three or four rows in depth. In such case the teacher's angle of vision is increased beyond that of  $45^\circ$ ," which is considered the proper angle of vision for the teacher. The Education Department suggests three rows, though often four, and even five, deep are to be seen in some Government schools. The London School Board has now adopted the short bench and desk, each seating two pupils, and in many respects the change has been found desirable. This dual seat is a development of the Swedish and American single-seat, and is really borrowed from the Dutch, who group in pairs.

The gangways between admit of ready access and egress, and less interference takes place when the master inspects the work of one child. It may be said this mode entails a greater space, but this is compensated for by the fact that with the new kind of desk introduced by the London Board, five rows now occupy the space of about three of the old plan; and a further advantage is, that the class shortens and is more compactly brought under the vision of the master. The dual desk has a lifting-flap, so that the pupils can stand up in front of their seats. Another advantage is claimed for this seat, the pupils are more isolated and concentrated upon their separate lessons, while the "sympathy of numbers" is maintained. The desks, which we have illustrated previously, stand free from each other. Three sizes are devoted to the graded schools. They have sloped tops and lifting-flaps, and back rails to the seats, the girls having a higher back rail. For infants, two other sizes are used with flat tops. Lugs cast on the iron standards enable the desk and bench to be firmly fixed in one, so that no fixing to the floor is necessary. The edge of each desk is perpendicularly over the front of seat. The movable flap enables the child to rise or sit. The old desks and benches, as it is observed, are very uncomfortable for sitting, being generally intended for standing. Each child has a bookshelf just under desk, a slate rack, a pen-groove, and an ink-well. In all the instances where this desk has been used we are informed approval has been the result after a little use.

Let us now describe the grouping or massing of these desks. We are given a suggested plan for a graded school for 210 children, embodying the desk five rows deep. The main school contains three classes of thirty each, lighted on both sides. It is 46ft. by 22ft. Each of the three groups, including gangways, is 15ft. 4in. wide, its depth 11ft. 3in., the desks being each 3ft. 4in. wide, gangways 1ft. 4in., distance from back to front of seats is from  $23\frac{1}{2}$ in. to  $26\frac{1}{2}$ in., or a mean of 25in. A double classroom with sliding partition, for eighty, is placed transversely at one end, and a single classroom for forty at the other end, in continuation of the schoolroom. Stairs and lobby, &c., occupy the angle between the double class and schoolroom. Curtains may be placed between the classes, and the then back rows of seats may be raised one above the other. Classrooms should be from 18ft. to 20ft. deep. The schoolroom should not be less than 20ft.; as it is generally also a passage-room, 22ft. would be better, and the Education Department have consented to this width for the Board schools of London and elsewhere. It will be seen that the old grouping of the Education Department has been retained, the desks being still arranged along one wall, allowing space in front for drawing out the classes. The floor space



allotted to each child is, we believe, not less than 9ft. in graded schools, 8ft. in infants' schools. In height 13ft. or more is required.

We here leave to our next notice the practical details of infants' graded schools; in the meantime we present our readers with two illustrations from Mr. Robson's work of the schools of the London Board, in Winstanley-road, close to the Clapham Junction of the South Western Railway. In this instance the infants' school is a separate building of one story, while the graded schools are carried on low piers and arches to obtain covered playgrounds about 8ft. high. The main stairs is treated as an octagonal external turret terminated as the belfry. The lighting of the graded schools is chiefly from the north. We think these schools are a successful adaptation of the very difficult site. The school accommodates 812: Infants, 316; boys, 248; girls, 248. The other illustration shows the new Haverstock-hill School, which is another peculiar instance of site adaptation. The boys' and girls' departments are arranged almost symmetrically, and opposite each other, forming two sides of the enclosed covered playground, the classrooms forming the other two sides. The infant school forms a separate block of L shape. The buildings cost £9,270, the accommodation being as under—

Infants .. .. .	447
Boys .. .. .	306
Girls .. .. .	306
Total .. .. .	1059

#### WHAT I NOTED IN PASSING THROUGH MANCHESTER AND LIVERPOOL.

**I** SUPPOSE there are people who judge architecture on much the same sort of principle a farmer judges a pig or an ox. To such, size and weight are easy of apprehension, and are elements about which they need take no trouble, for neither education nor eye are needed to estimate the value of buildings when measured solely by the standard of feet and inches. It is much to be feared that this utterly base standard is beginning to influence the works of modern architects to an unwholesome degree. Of Mr. Street's Law Courts, of the successful design for the Berlin Houses of Parliament, of Sir C. Barry's Victoria Tower, of Mr. Verity's Criterion, I have heard the size of certain features, if not of the whole, spoken of as something meritorious in itself, and as "quite too superior to trifling questions of proportion, outline, detail, &c." Even the rival merits of two spires I have heard satisfactorily settled by the discovery that one was 20ft. higher than the other.

Now, the city of Manchester is throughout one vast illustration of this regard and reverence for mere size. Street follows street with an uniform gloomy hugeness; flat dreary reaches of wall stretch on for miles without one square foot of beauty to gladden the eye, and the stone of which most of it is built—fair and beautiful at first—becomes in a few short years of a funereal tone, giving to the monotonous masses an aspect which in the quiet and silence of early morning is depressing and sad almost to the degree of horror.

If we look closer, we shall find that this sense of gloom permeates everything—not merely the general street architecture, but the special buildings with which the readers of this journal are familiar through the illustrations that have from time to time appeared. Whether we take the Free Trade Hall or the Assize Courts, the Exchange or the new Town Hall, we are conscious more or less of the presence of some such sort of (architectural) infliction as that under which Sindbad the Sailor suffered. Primarily, I have little doubt that this is owing to an over-development of the first-floor at the expense of the ground-floor, the result of which is that

the buildings look as if their huge weight had partially sunk them, and consequently dwarfed the ground-story. The full extravagance of this is seen at the Exchange and in the principal front of the new Town Hall, where the height of the first-floor windows preponderate in an undue degree, even for Manchester. In quite secondary buildings, as for example, in the façade of the Prince's Theatre, the same objection applies, and it strikes me as an instance of strange architectural blindness to find such an error perpetuated in the very latest buildings. There are two or three prominent exceptions to this Manchester rule—viz., the semi-Venetian Gothic building in the corner of Albert-square, and the Police Courts, but even here, though the ground-floors are preserved, the prevalent gloom has not been avoided. Another feature very common in this city is the angle oriel. At the Town Hall, Club House, warehouse, everywhere and anywhere, we meet with this object, planned on the octagon or the circle or the square, set diagonally—in all the result is without exception awkward, exhibiting sometimes a lamentable want of knowledge as to the construction of these things, or at the best a wriggling effort to do something odd. There have been many great opportunities for producing good and important effects in street architecture thus sacrificed. But although the practice has hitherto resulted in failure, the attempt to emphasise the angles of streets and town buildings is altogether praiseworthy.

If we leave Manchester and charter a cab along any of its endless suburban roads, the eye, in search of the artistic, has to suffer to an amount unparalleled in any town in England. Three churches are the only things worth looking at after driving miles on four different roads. The church of the Holy Innocents, Fallow Field, by, I believe, Messrs. Price and Linklater, is simple and well proportioned, with an especially good apse and a charming effect of colour, obtained by using red stone dressings to a sort of grey-yellow wall stone. A small church at Stretford (R. C.) has a west front with steeple on one side, both admirably designed to the minutest detail. I could not learn the name of the architect, but I think I might have sought it out had he been consistent and designed the rest of the building in anything like the spirit of the façade. As it is, it looks as if a very clever first-rate artist-architect had drawn the west end, and left all the rest to a builder's clerk or auctioneer.

But it is at Pendlebury that lovers of modern ecclesiastical architecture will find their chief delight. Mr. Bodley has here given a large simple church of ten bays with narrow internal aisles, only pierced, that is, through internal buttresses. The last bays east slope inwards, and so give extra loftiness of appearance to the square east end, which is here the front of the building really, as well as ecclesiastically. The style is the transition from Decorated to Perpendicular, and the materials are brick and stone. The work is not quite finished; for the numerous statues in the panels of the east gable and at the sides of the window are still wanting, as is also the chief portion of the internal painting.

Coming back from Pendlebury, I could not avoid the thought that the R.C. Cathedral at Salford, built in early revival days, is still vastly superior, notwithstanding many commonplace features, to the new thin wiry church in Oxford-road, a building whose huge mass and flying buttresses cover a multitude of errors.

Fresh from Manchester oriels and plate-glass Gothic, the "Classic" buildings of Liverpool give quite a pleasing sensation even to a Goth like me. The style, with its many unmeaning features, may be objectionable on the score of climate and creed and common-sense; but still it seems to me that there is more thought—that the buildings have been more carefully worked out—here than in Manchester.

Mr. Robson's Municipal Buildings, for example, is altogether a better thing to look at, and a more careful study, than the Manchester Exchange. The tower and square spire make up a solid, well-proportioned mass from whatever point it is viewed. There are here and there queer bits of detail, and pillars brought in for pillar-sake; but without shutting our eyes to the defects, one cannot avoid noting the breadth, the repose, the rhythm of the whole pile, and wish that our Gothic architects hereabouts would take a few hints from such work.

Of S. George's Hall there is nothing new to say. It is still, as it always was, and I suppose always will be, the best thoroughly Classic work in this country. Being such, it is strange that the authorities have not made up their minds before this to subdue the white glare from the end windows of the Great Hall, by introducing glass of a golden tone. I saw a few panes, put up by way of experiment, I suppose; but if this is the only way to do it, I hope the authorities may ever remain undecided. By the way, a small piece of gutta-percha or indiarubber on the legs of the chairs placed on the tiles would prevent the disagreeable scraping noise visitors seem compelled to make, and which are so jarring to the ear, during the most delicate passages of Mr. Best's recitals. To keep them off the cold tiles, gentlemen *will* put their feet on the bars of the chairs in front of them; hence occurs the movement, and the inevitable offensive scrape. Of ordinary domestic architecture Liverpool seems to know nothing. When you have marked off its few public buildings and the Lime-street Station Hotel, you come to the end of architecture as far as the town is concerned. But within an easy drive another of Mr. Bodley's characteristic works may be discovered in the church of S. John the Baptist, Tuebrook, West Derby. Before we get there we pass three new churches and a sailors' orphanage, all good—Emmanuel Church particularly so. Indeed the churches in and about Liverpool, in general composition, in proportion and detail, show a higher appreciation of Gothic art than that which apparently exists in the neighbouring city. If, however, the churches of Liverpool have the advantage over those of Manchester, the latter town has the superiority in places of amusement. The Prince's Theatre in Manchester is altogether in advance of any theatre I know in the United Kingdom. Such faults as it has are mainly superficial—e.g., the colours and patterns on the pedestals of the proscenium piers, and a trifle too much warmth and solidity of colour in the general effect. The winged figures on the ceiling are not altogether satisfactory, and can scarcely be said to harmonise with the painting over the proscenium, one of Mr. Marks' happiest works, both in colour and composition. On the other hand, in Liverpool the art of the drama is just barely housed, and not one of its five so-called theatres is other than a disgrace to the town: some of them would even be a disgrace to a half-civilised village, whether we regard the construction or the "decoration," the fittings or the sanitary arrangements. In theatres, new or old, town or country, there is a strange blank on this sanitary question, and officers of health seem to be everywhere totally unconscious of the wretched condition in which these buildings are suffered to remain.

EDWARD W. GODWIN.

#### TOWN AND COUNTRY "QUANTITIES."

By SOLOMON SET-SQUARE.

**F**URTHER reflection on the proceedings of the recent General Conference of Architects confirms us in the half-expressed discouraging view of it taken weeks ago by this journal. Were its sympathies merely metropolitan, our readers might well expect to find in the BUILDING NEWS consoling reflections



on the sevenfold collapse of the effort to convene, in the form of one "united happy family," our town and country architects. Much is expected of the next Conference; and, looking at the chaotic state of architectural practice all over the kingdom, we cordially echo the good wishes of the expectants. To prove our sincerity, we will venture on a suggestion for giving usefulness and vitality to its proceedings. Let it, at least, aim at consistent loyalty to its title—"General Conference of Architects"—and leave to our thousand-and-one architectural conferences and societies the palaver on elementary and aesthetic questions on which so much time is now consumed. We wish, too, that the dinner could be dispensed with (though this, we know, is out of the question); for, in the confessedly lugubrious condition of things, it is ghastly to listen to or peruse the complimentary orations of the banquetters. A Conference of actually practising "architects" ought surely to occupy itself with topics pertaining to the architect's trade, if we may use the term, rather than with those of his art and its cognate sciences; since these latter are being every day—or at least every week—written on and discussed all the year round. We have ourselves said the same thing of the Institute of Architects for many years past; with what truth let the abortive proceedings of the late Conference show. Our contention has been for years that the Institute of Architects is far too prone to ignore its actual name, and to settle down into a mere architectural society, for the reading of essays—no matter by whom—the conservation of ancient structures, the interchange of compliments truly cosmopolitan, the bestowal of medals quite unsought for, and for that very reason worthless; the dead-levelling up and down of the quack and the expert by *quasi-degrees*, F.R.I.B.A. and A.R.I.B.A., based on nothing but money and the annual disbursement of it in a few books and a deal of coffee. The Institute lacks funds to continue this not very practical "kind of thing;" and we are far from certain that these loudly-bewailed *res angustæ domi* are in strict truth a professional calamity. We have always regarded the Institute with affection, for it is our only chartered body of architects, and we desire to see it flourish, not in the smiles of princes, but in the loyal adhesion to its ranks of every respectable British architect. Some signs there are of emendation of its ways. The Voluntary Examination movement is one of them, and the compiling of a schedule of professional charges is another—peradventure the hints thrown out at the late Conference by the provincial architects may urge it to a more useful course of action in the real interests of the profession it claims to represent all over the empire and does not represent at all. The Institute has now been in existence nearly forty years without drawing into its ranks, as it might have done, the whole body of even London practitioners. We all know how the large cities of the empire teem with eminent architects; and of all these, how very few in each are either Fellows or Associates of the Institute! For years past we have in this journal called attention to the anomaly. We discern no change in it whatever; and now we have in the doings, or rather "sayings" of the recent Congress, a rude reminder of the alarming discord that, in a vital matter of professional practice, rends, beyond apparent prospect of fusion, the Town and the Country party of "British Architects," whose *Alma Mater*, or "Institute," we "make believe very much," with Dick Swiveller's Marchioness, is cosily enshrined in Conduit-street.

We refer especially to the question of "The Employment of Surveyors," as to which we must say, in justice to the Special Committee to report on it, the attitude of the Institute has a somewhat slippery aspect—but this by the way. The grave importance of the question was well asserted by one of the Manchester speakers (Mr. Worthington) when he said

had the Conference been called to consider this matter alone, it would have been time profitably spent. The debate that ensued on the reading of the rejected report of the Special Committee, while it showed how wide is the divergence of country practice from that of the Institute Fellows, rather than of the great body of London architects, clearly established, as said another speaker (Mr. Edward Hall), the convenience of country architects taking out their own quantities. It is but some two years ago we reviewed in this journal an admirable address of the then President of the Architectural Association, strongly advocating the same practice; and, as our lists of tenders constantly show, it is the custom of many London architects, not affiliated to the Institute, to supply their contractors with quantities. The Institute has indeed separated itself from the general body of practitioners all over the country in this matter of tabooing the quantities. It has during the forty years of its existence succeeded in raising a body of English—or, say, London—architects who, with Falstaff, are "ill at reckoning." We have heard in our time of a Fellow of this learned body who was unable to even *square a dimension*; and Country architects who came up to this last Congress must have been scandalised to hear another Institute Fellow assert the impossibility of a man's being both an artist and a surveyor. How this gentleman, who has now so close a connection with the famed "Surveyor" of S. Paul's, contrives to *certify*—that is to say, *state on sure grounds*—what sums are due from time to time to contractors he rules, is an enigma. Mr. Rickman tells us the origin of the present class of measuring or quantity surveyors is due to the introduction of the system of tendering for the execution of works. It is rather due to the disastrous law of the Institute, that discourages in its members the faculty of estimating and measuring up works. These unfortunate gentlemen cannot, as a rule, do either; and, as some one must estimate and measure and will have to do till the Millennium, "the class" Mr. Rickman speaks of has been called into being by the incompetency of Institute architects. That this is so is proved by the prevalence of the selfsame "system of tendering" in the provinces, side by side with the prevalence of country architects supplying their own quantities, to the exclusion and comparative non-existence of "the measuring or quantity surveyor." A curious feature of the question is this, which anyone may readily verify; viz., that the Institute has no power of propagating its doctrines beyond the Metropolis. If an Institute man leaves London, and attains to a country practice of any extent, he straightway ignores his town training, adopts the country mode, and settles down into a confirmed quantity-taker, that is to say, architect, who, by his clerks in office or personally, computes the quantities of his own buildings. From these he draws up his own specification, and, with the aid of their expressed details or dimensions, prepares his full-size working drawings, with a confidence as to their fair or unfair conformity with the contract quite unknown to his metropolitan brethren of the Institute, many of whom, from shirking the quantities, have now fallen into the bad habit of having their specifications drawn up by the building or quantity surveyor.

With respect to the now-condemned process of incorporating the bills of quantities with the contract in any other way than the Glasgow one, of remeasuring the whole in the building on its completion, Mr. Morris, another Conference speaker, said, with perfect truth, "the interests of the client must suffer, especially with an inexperienced architect; but the builder, with his staff of clerks and assistants, watching and testing\* every item in

the bill of quantities, would take care that he did not suffer. If he found any part of the quantities in excess, no one would hear of it, but the moment he discovered a defalcation in the quantities the client would be debited with it."

It is fortunate for the credit of metropolitan practice that not every London architect is affiliated to the Institute, with its impracticable veto against estimating and measuring artificers' work. Well would it have been for this Royally-chartered body if, some forty years ago, its promoters had profited by the advice of the late Sir John Soane, who, whatever his shortcomings as a man and an artist, had the good sense to warn his brethren against the evil of deterring young architects from the wholesome practice of measuring-up and estimating works, a practice which he then declared he had himself pursued in his adolescence, measuring works for the founder of the firm of Holland and Hannen. Sir John assigned to this practice much of his own acquaintance with practical construction. The late Sir Charles Barry has been known to avow the same thing, and felicitate himself on an early professional training in the office of a then eminent firm of building surveyors. As this grave Quantity question now stands inchoate and unsettled till the next General Conference, we cannot say that the Institute occupies a very enviable position. It numbers in its ranks very many thoroughly educated architects, able at any moment to officiate as building surveyors, in the strictest acceptance of the term. Let them—especially the older Fellows, who remember more sternly practical times—exert their influence to effect a total change in the constitution of the Institute; and, above all things, let us hope to see the measuring veto abolished. The intention of its framers was doubtless good, as an effort to encourage a more artistic class of architects; but we see from this Conference discussion how it has worked—in the creation of a class of London architects who are fast becoming mere draughtsmen and *dilettanti*, pushed hither and thither aside from their province, and left to mourn over the encroachments they suffer.

Mr. Chatefield Clarke warned the Conference that, were architects to meddle with quantity-computing, "that honourable body of men, the estimating surveyors," would run the risk of being improved off the face of the earth: There is no fear of the apprehended calamity. Very many of these gentlemen are regularly educated architects, students of the Royal Academy, and more: they are fitter by far as a body to practise as architects—*bonâ fide* architects—than very many of the ornamental gentlemen at whose offices they have now to dance attendance. We are fast falling into the actual want of such men for the *matériel* of the architect of the future.

The greatest difficulty in the solution of this question is the unreasoning greed of capitalists and public bodies to attain that Utopian object, a rigid, unelastic, unalterable lump contract price of a building—no matter how large, or how liable to mutation in form, extent, or finish, during the period of its construction—witness the struggle of the late Commissioner of Public Works with Mr. Street in the case of the Courts of Justice. We call it a Utopian object, and it is one; for, since the building of the Tower of Babel to this day, no considerable structure has ever been raised in absolute conformity with its original design—in other words, there is no such thing as an immunity from "extras and omissions." To ourselves the Glasgow system of contracts, by which a lump contract sum, based on a tentative estimate, drawn up by a certified and sworn surveyor, is, on the completion of the works, adjusted by that same surveyor by a total remeasurement at the builder's scheduled prices,

\* It must be observed that London builders claim from the building or quantity surveyor a complete copy of his dimensions and abstract, enabling them *ex parte* to do

this. The architect, on the client's behalf, seldom consults even the completed bill; and never, as a rule, gets an insight into the dimensions and abstract.



seems the one best deserving the consideration of the next English Conference of British Architects, whenever it may be convened; and the sooner the better. Under such a system we see no objection to the architect's standing aloof from the quantities; for he knows he can, with absolute justice to his client, let them come and go unchallenged, resting content in perfect assurance that, any errors of over and under-measurement will, in the end, be rectified, not only in the interest of the contractor, but the client. The system is admirably elastic; for, if the architect should be one who plumes himself on knowing nothing of surveying, all he has to do is to fall back with his client on implicit confidence in the sworn surveyor. If, on the other hand, he be a quantity-taking architect, and prefers to interfere, he can personally or by his clerks take part in the preparation of the quantities and the final admeasurement of the works, pocketing, as he fairly may, a moiety of the fees. This Scottish system possesses, moreover, the advantage of assessing, from time to time, during progress of the work, its true schedule value for certificates of instalment—in England a fruitful source of ill-feeling and litigation. Let no one say it is but a return to the old mode of "measure and value," once so prevalent. It is not so; for, by that exploded method a client could never know till the accounts came in what his building was likely to cost. By the Glasgow system the surveyor's tentative estimate (prepared from the architect's plans) gives the client a fair idea of the ultimate cost, while the periodical admeasurements would reliably indicate how much the architect was actually expending on the work. In England we may truly say, neither the existing London nor provincial systems of contracting are quite satisfactory to any one.

#### NOTES IN THE STREET.—I.

ONE or two remarkable buildings lately erected call for more than ordinary notice, as illustrating a recurrence to principles considered somewhat *effète*, if not a fresher and more vigorous expression of a style deemed rather "used up." We have had the Palladian, the astylar, and other modes of façade expression more or less purely rendered. Sir Gilbert Scott has given us an instance of the Palladian treatment in the New Foreign Offices, Whitehall, and Messrs. Banks and Barry have done the same in Burlington House, Piccadilly—two notable instances of the pliability of what is called "Italian" for modern wants. It is a sign of some import to discover in these buildings a less restricted use of Classic orders and forms. In street buildings limited in ground area, the architect is compelled to adopt a flat front; he cannot emphasise any portion or recess others without curtailing his area, and he is therefore called upon to devise a treatment depending entirely on fenestral and other architectural arrangements. He can break his front by diversities in roofs, skyline, variations of level, or he can obtain the effect by the use of such expedients as pilasters, columnar breaks, &c. One striking instance, and to a certain extent we think successful, of a flat street façade, is a building which has attracted a large amount of attention from passers-by in Ludgate-hill, not far from St. Paul's, Mr. T. Dudley, of Pall Mall, being the architect. The façade is relieved by slight projections or wings, the centre part being recessed. Instead of the ordinary square angle or pilastered projection, the angle between the two faces has an attached column of about three-quarter projection to emphasise the wings. The result is pleasing, though a departure from strict models. The piers with their triple clusters of shafts are also an innovation; but the manner in which the fenestral portion is treated, the piers being strongly marked, and the parts between the

heads and eills being sunk and enriched by carving, is a satisfactory change from the ordinary flatness and monotony noticeable. The two upper series of windows are particularly light and elegant; with the exception of the rather *outré* carving of capitals and strings and keystones, and the carved panels which seem equally extravagant, this façade has much to commend it. We certainly think, however, the carver has over-done his part of the work, though the carving *per se* attests the skill of Mr. Bromfield's chisel. The cornice crowning the building is shallow, and is happily relieved with a spirited shell-pattern. The lower string-course over shop-front has spiral terminations—a rather freakish way of finishing this feature, though perhaps more original than the routine block or truss stop. The abaci of the capitals are too prominent, and form nooks for dirt; and the over-fussy carving in the panels and keystones is open to the same fault. Another feature we object to is the rather extravagantly carved band-work round the shafts, in questionable positions, and even more doubtful taste. The most noticeable point in the façade is the large proportion of aperture to stone-work, and it is one which we think gives zest and piquancy to this composition.

The City Temple, on the Holborn Viaduct, is another building calling for notice. As a Congregational church limited in area, it may be taken as a good example of plan. It is a parallelogram in form, entirely surrounded by galleries which have circular fronts at the ends. These are carried by cast-iron moulded and capped columns in two orders, the upper row supporting a clerestory with semicircular lights, from which the ceiling, which is a flat segment, springs. This arrangement admits of many advantages in such a structure; it reduces the span of roof, gives a more architectonic appearance to galleries—the bugbear of ecclesiastical art—and also a variety which is unattainable in the ordinary one-span arrangement. The ceiling has panels dividing it into long geometrical shapes transversely; its curve seems to spring too abruptly from the clerestory cornice, and needs a slight stilted or attic. The seats are arranged curvilinearly, being segments on plan, the vestibule wall behind being of the same shape; they are of good design, spacious, and with comfortable sloping backs, the material being varnished pine. The pulpit is handsome, having coloured marble panels. The exterior has a boldly recessed loggia or entrance of two orders, the staircases flanking it, forming on one side the tower, which is a conspicuous and well-outlined object from the neighbouring streets. The lower part of tower, which is square, has projecting angular pilasters which look too weak, and give inadequate base to the superimposed order, which seems to crush them. The flank sides of the structure exhibit externally a poor appearance, and their heavy pilastered faces contrast badly with the pilasters of portico and tower. The entrance front, however, with its coupled shafts of two stories, and pediment with carved tympanum, forms a well-managed composition as a whole. The octagonal lantern of tower is broken by coupled columns on the short alternate sides, the effect of which would have been improved if the cupola termination was rather higher or its terminal more prominent. Messrs. Lockwood and Mawson were the architects, and Messrs. Myers the builders.

#### THE LATE GEORGE HENRY STOKES, ARCHITECT.

WE regret to note in the public prints, the death of Mr. George Henry Stokes, architect, in his 47th year, at his residence at Darley House, Matlock. The deceased was a gentleman well known and esteemed in the profession some few years since, but was not prominently before the public of late, having retired from business some time, owing to ill-health. When a very young man he was employed by the

late Sir Joseph Paxton as principal assistant in the designing and carrying out of the first Crystal Palace, also many other architectural works, such as the restoration of one or two churches in Derbyshire, and the splendid mansion of the late Baron Meyer Rothschild, at Mentmore. Mr. Stokes designed and carried out the great Chateau at Ferrières, near Paris, for the late Baron Jas. Rothschild, and also one at Pregny, near Geneva, for Baron Adolphe de Rothschild, extensive alterations at Aston Clinton for Sir A. de Rothschild. The mansion at Halifax, for the late Sir Frank Crossley, was also one of Mr. Stokes' happiest efforts, as also Battlesden, in Bedfordshire, the seat of the late Sir E. Page Turner, Bart. The very extensive buildings, concert hall, &c., of the Cliff Bridge Co., Scarborough, were designed and carried out by Mr. Stokes, as also the rebuilding and recasting of Lismore Castle, in Ireland, for the late Duke of Devonshire, and the park buildings and terraces of Halifax and Dundee public parks. Mr. Stokes was the "chef" of Sir Joseph Paxton's large staff during the building of the Sydenham Crystal Palace, and the arrangement of the terraces, cascades, and fountains, was mainly inspired by him. The Sheffield Court in this building was the special work of Mr. Stokes. It is curiously instructive to note the changes death makes in a small group. Mr. Stokes has only survived by a few weeks his friends Sir Chas. Fox and Owen Jones, and only by a few months his patrons, Baron Meyer Rothschild, Sir Ed. Turner, and Alex. Barker, Esq. Mr. Stokes was married in 1853 to Emily, eldest daughter of the late Sir Joseph Paxton. He leaves no family.

#### MANCHESTER SOCIETY OF ARCHITECTS.

THE annual meeting of this Society was held at the Royal Institution on Monday, June 22nd. The report of the retiring council was read, referring to the work done by the Society during the past session, the more prominent matters being the efforts made to promote the education of architectural students; the technical education of the workmen of the building trades; and the endeavours that are being made to induce the City Council to adopt such building regulations as would have the effect of a Building Act, &c. The thanks of the Society were tendered to the President, Council, and the Honorary Secretary for their services during the past year. The following gentlemen were elected officers for the ensuing session: President, J. Murgatroyd, Esq., re-elected; Vice President, Isaac Holden, Esq.; Honorary Secretary, John Holden, Esq.; Council, Messrs. A. W. Mills, G. T. Redmayne, Wm. A. Royle, Edwd. Salomons, and J. M. Taylor.

#### THE ASSYRIAN EXCAVATIONS.

AN address was delivered before the Society of Biblical Archaeology on Tuesday night, by Mr. George Smith, of the British Museum, on the subject of his recent excavations at the site of Nineveh. After referring to some of the fragments of historical tablets discovered in the Palace of Sennacherib, Mr. Smith urged that further work ought to be done. 1st. The great library in the palace of Sennacherib ought to be completely excavated and all its treasures recovered. He calculated that there must be 20,000 fragments of cuneiform tablets still buried there, and it would require three years' work and the expenditure of £5,000 to complete the excavation. 2nd. The centre and eastern portion of the mound of Kouyunjik requires to be further investigated. The relics here are of an earlier age than those from the palaces of Sennacherib and Assur-bani-pal, and will throw light on the more ancient period of Assyrian history. 4th. There should be as complete an examination as possible of the mound of Nebbi Yunas. 5th. The ruins of the wall and body of the city should be investigated. 6th. Examination should be made round the wall for Assyrian tombs, particularly for Royal tombs, as with reference to them we are at present totally ignorant of Assyrian customs. There are numerous other sites in the country which would also repay excavation.

The new Church of St. Andrew, Hadfield, was consecrated on Saturday. The contract has been carried out by Mr. Wharum, builder, of Hyde, from plans designed by Messrs. Medland and Henry Taylor, of Manchester.



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THE PHILIPSON MEMORIAL ORPHANAGE—CAPITALS, MOISSAC ABBEY CHURCH OF S. SAVIOUR, MORTOMLEY REREDOS, S. BARTHOLOMEW'S CHURCH, ARMLEY—S. GERMAIN'S, CORNWALL—SH. P. PARK ROW, LEEDS.

## OUR LITHOGRAPHIC ILLUSTRATIONS.

## "THE PHILIPSON MEMORIAL" ORPHANAGE

Is to provide a home and education for 100 boys, without teaching them a trade. It forms one of a series of similar institutions for the northern counties, and is neighbour to a sister building. "The Abbott Memorial," an orphanage for girls, the two being under one government. Referring to the ground-plan, over the schools, dining-hall, and matron's room are the dormitories, on first and second floors, where the beds are arranged with 2ft. 3in. spaces between them, and 2ft. 9in. for width of bed; the dormitories average 12ft. high from floor to ceiling. Masters' bedrooms occur between the boys' rooms, and communicate with them for supervision. Over the committee-room is the matron's bedroom, and above it a spare room; over the kitchen are the servants' rooms, and above the scullery and pantry is a spare room, useful on account of its distance from the boys' quarters for the reception of cases of doubtful health, until it be decided that the case is one to be handed over to his friends or to the infirmary, as it is not intended to keep up a regular infirmary department in the building for so small a number. Baths and w.c.'s, with cisterns and lumber-room over, are placed in the tower for the use of the domestic part of the household. The boys are to use the lavatories and bath on the ground floor: this bath is in communication with the boiler in chamber under staircase, which heats water coils for airing the corridor and passages above, and will provide a tepid bath for eight or nine boys at a time. Only small wash-house accommodation is needed, as the laundry work will be done at the girls' orphanage hard by. For simplicity of management but one staircase has been provided; it is of stone, wide, well-lighted, and central. All the dormitories are provided with open fireplaces, and are arranged to be aired at ordinary times from the corridors, through gratings over the doors. An effort has been made to keep the architecture—if indeed it is worthy of the term—of the building of the simplest character. The materials are the common grey bricks of the district, with a slightly red brick used every four courses in the lower stage, and in voussiors of arches and quoins of chief windows. The dressings are of a hard white stone, from the Ellswick Quarries. The roofs are to be covered with Westmoreland slates. The walls are 20in. thick, with a 2in. cavity, bonded with glazed brick ties; internally they are plastered, having in the schools and corridors pine wall-boarding 4ft. high. The floor joists are laid on moulded brick corbel-courses, forming cornices to the rooms below.

The contract is being carried out by Messrs. J. & W. Lowry, builders, of Newcastle-on-Tyne, for the sum of £9,789, from the plans, and under the superintendence, of Mr. Geo. Tunstal Redmayne, architect, of Manchester.

## SHOP AND BUSINESS PREMISES, PARK-ROW, LEEDS.

This building has been lately erected for Mr. Archibald Ramsden, for the purposes indicated above. The offices of the Royal Insurance Company occupy the adjoining site, on the right, and Mr. Ramsden's building has been designed to group with them. The front is built of Harehill stone, and shafts of Aberdeen granite are used in the windows of the upper stories. The frontages to Park-row is about 53ft., and the depth from Park-row to Basinghall-street is about 100 feet. All this area, with the exception of the part used for stair to offices, is occupied by the show-room for pianos, &c. It is divided into three aisles by pillars and beams, and the centre aisle of the back part, which is only one story

above the ground level, is lighted by a glass roof, in the form of a waggon vault. The basement story is used partly for another show-room, and partly for work-rooms. The two floors of offices above are occupied by the Inland Revenue, and the housekeeper's rooms are above these. The architect is Mr. George Corson, of Leeds.

## S. GERMAIN'S, CORNWALL.

A general description of this church, together with a drawing of the sedilia, stoup, &c., was published in the BUILDING NEWS of June 17th, 1870. As may be seen by the sketch, the main porch, like most Norman specimens, is elaborately carved into the chevron and beak ornament, and is in a charming state of preservation. The South Tower dates with the body of the church as far as the Belfry, which is much later. The whole of the North or Ivy Tower is of the Early English Period, and remarkably simple, and in consequence of its green parasite, its masonry is a perfect piece of network, and requires a deal of ingenuity to prevent its being thrown to the ground.

H. A. G.

## REREDOS, S. BARTHOLOMEW'S CHURCH, ARMLEY.

We give this week an illustration of a proposed reredos for the church of S. Bartholomew, Armley, near Leeds, now in course of erection from designs by Mr. Henry Walker and Mr. Josh. Athron, architects, of Leeds, views of which appeared in our journal of 8th Sept., 1871. The church, it will be remembered, is a cross church, having nave and aisles, transepts, central tower, and apsidal sanctuary (the choir being under the tower). The reredos will stand 5ft. off the east wall, and be elevated nine steps above the level of nave-floor. The apse, it will be seen, has wall-arcading, with panels for mosaic work above, the cills of windows being thus kept high. It is intended to construct the reredos of alabaster, with shafts of different-coloured marbles, and glass mosaic back-grounds to the figures.

## S. SAVIOUR'S CHURCH, MORTOMLEY, YORKSHIRE.

The design for this church was selected in a limited competition, the several competitors being local architects, with the exception of Mr. Brooks. A professional referee, whose decision was final, adjudicated the award. It has been erected as a chapel of ease to the parish church, by public subscription, in memory of Parkin Jeffcock, Esq., C.E., who lost his life in the Oaks colliery disaster, having ventured into the mine with the purpose of rendering assistance to others. The cost of the building was about £1,800. Seats are provided for 250 worshippers. The walling stone, inside and out, is from Woodenbridge, near Manchester; the courses run in thickness from two to three inches. The columns, arches, quoins, caps, and bases, are of a beautiful hard stone from the Greenside quarries, and are finished with an irregularly-tooled face. The roof is constructed of fir, and the bell-cot is arranged to accommodate four bells. The seat benches are of deal. The windows will form, when complete, a regular scheme of painted glass, illustrating incidents of Parkin Jeffcock's life. Those already executed are by Messrs. Clayton and Bell, from the architect's designs. The builders were Messrs. Longmire and Burge, of London. The site was given for the church by Parkin Jeffcock's father. We congratulate Mr. Brooks on the characteristic suitability of this interesting work.

## CAPS IN CLOISTER IN MOISSAC ABBEY.

For description of this illustration and interesting sketch of history of this abbey, see Mr. Deshon's article, p. 73.

## BEAUVALE—MR. E. W. GODWIN, ARCHITECT.

This house—illustrations of which we gave last week—is erected in the middle of a wood on the edge of Sherwood Forest. This at once explains the reason of a tower, viz., to overlook the wood and obtain the many distant and charming views of the surrounding country. The materials used are red brick, red Mansfield stone, from Mr. Lindley's quarries, red tiles to the roof, and timber stained black, with brick nogging. The cost has been under £6,000. The builder was Mr. G. Simpson, of Tottenham Court-road, the ironwork was by Messrs. Hart and Son, and the works were ably overlooked by Lord Cowper's bailiff, Mr. Taylor.

## COMPETITIONS.

CHESTERFIELD PUBLIC HALL COMPETITION.—Twenty-seven designs have been submitted in this competition. Mr. T. C. Hine, architect, of Nottingham, who was retained by the building committee to report on the designs sent in, has issued his report, in which he says that there are so few designs marked by a rigid adherence to the printed conditions that, in the selection of the merely premiated designs, he is compelled to overlook some departures from the same. He considers the following to be the five best designs in order of merit:—No. 1, "Hope," Messrs. Smith and Woodhouse, Manchester; No. 2, Maltese Cross, Messrs. Rollinson and Masters, Chesterfield; No. 3, "Lux," Mr. J. C. Gilbert, Nottingham; No. 4, "Carbon" (alternative design), Mr. H. J. Paull, Manchester; No. 5, interlaced triangle with letter E, Mr. J. B. Everard, Leicester.

EAST ARDSLEY SCHOOL BOARD.—The competition for the new schools to be built by this Board has just been decided. Thirteen sets of designs were submitted to the Board, who have awarded the first premium to Messrs. Holton and Cannon, of Dewsbury, with instructions to proceed immediately in preparing the contract drawings.

LAMPETER.—The Board of Guardians of the parish of Lampeter, in Cardiganshire, having been required by the Local Government Board to erect a workhouse, invited four architects to submit designs for the same. After duly considering the plans, in conjunction with the Government Inspector, they selected those submitted by Messrs. Szlumper and Aldwinckle, of London and Aberystwith.

## PARLIAMENTARY NOTES.

THE WORKING MEN'S DWELLINGS BILL.—On Friday, in the House of Lords, on the motion of Lord Shaftesbury, the Working Men's Dwellings Bill was read a second time. The measure empowers corporations to sell borough lands to be laid out in streets and building allotments for the erection of houses by the working classes. In the course of a short discussion, the Duke of Somerset uttered a doubt whether the bill was workable; the Marquis of Bath suggested some amendments; and the Lord Chancellor said he feared that, after parting with the fee simple, corporations would not be able to control the owners as to the manner of dealing with it.

THE PROPOSED ROADWAY AT HAMILTON-PLACE.—Mr. Goldsmid, on Monday, asked the First Commissioner of Works whether he had now come to any decision with regard to the new roadway from Hamilton-place to Grosvenor-place. Lord H. Lennox said the plan he had under his consideration was not sufficiently matured for him to present it to Parliament.

THE NEW GOVERNMENT OFFICES.—Mr. Goldsmid also asked the First Commissioner of Works whether he proposed to purchase the block of buildings between the new Home and Colonial Offices in Parliament-street and S. Margaret's-square.—Lord Henry Lennox said the subject was now under the consideration of the Government, and until a decision was arrived at he could not answer the question.



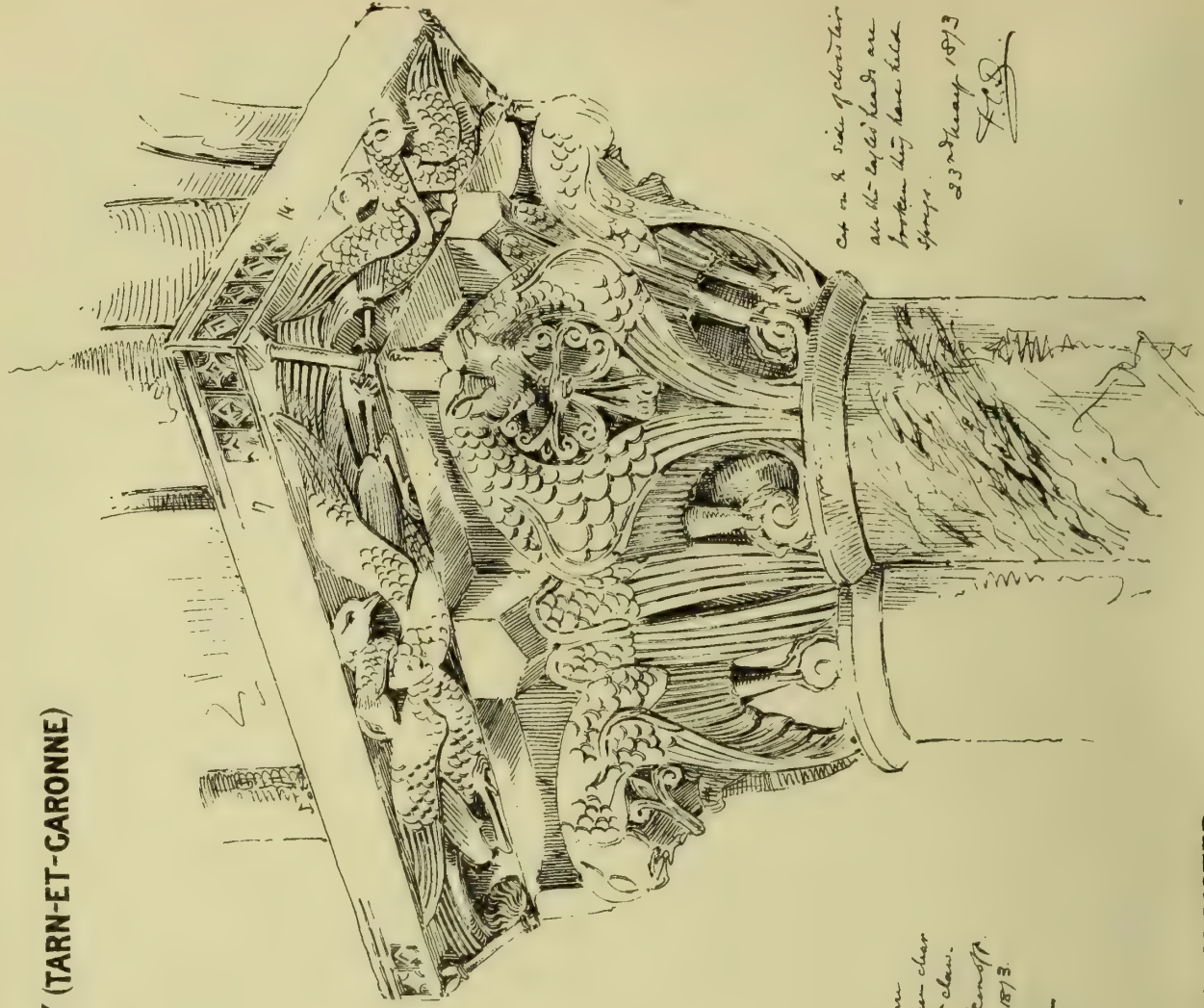




MOISSAC ABBEY (TARN-ET-GARONNE)



Cut on 1/4 side of  
cloister.  
18 legs marked as an  
broken off they have been clear  
of the cap from today to clear.  
Backs backs are broken off.  
23rd May 1873.  
F.R.S.



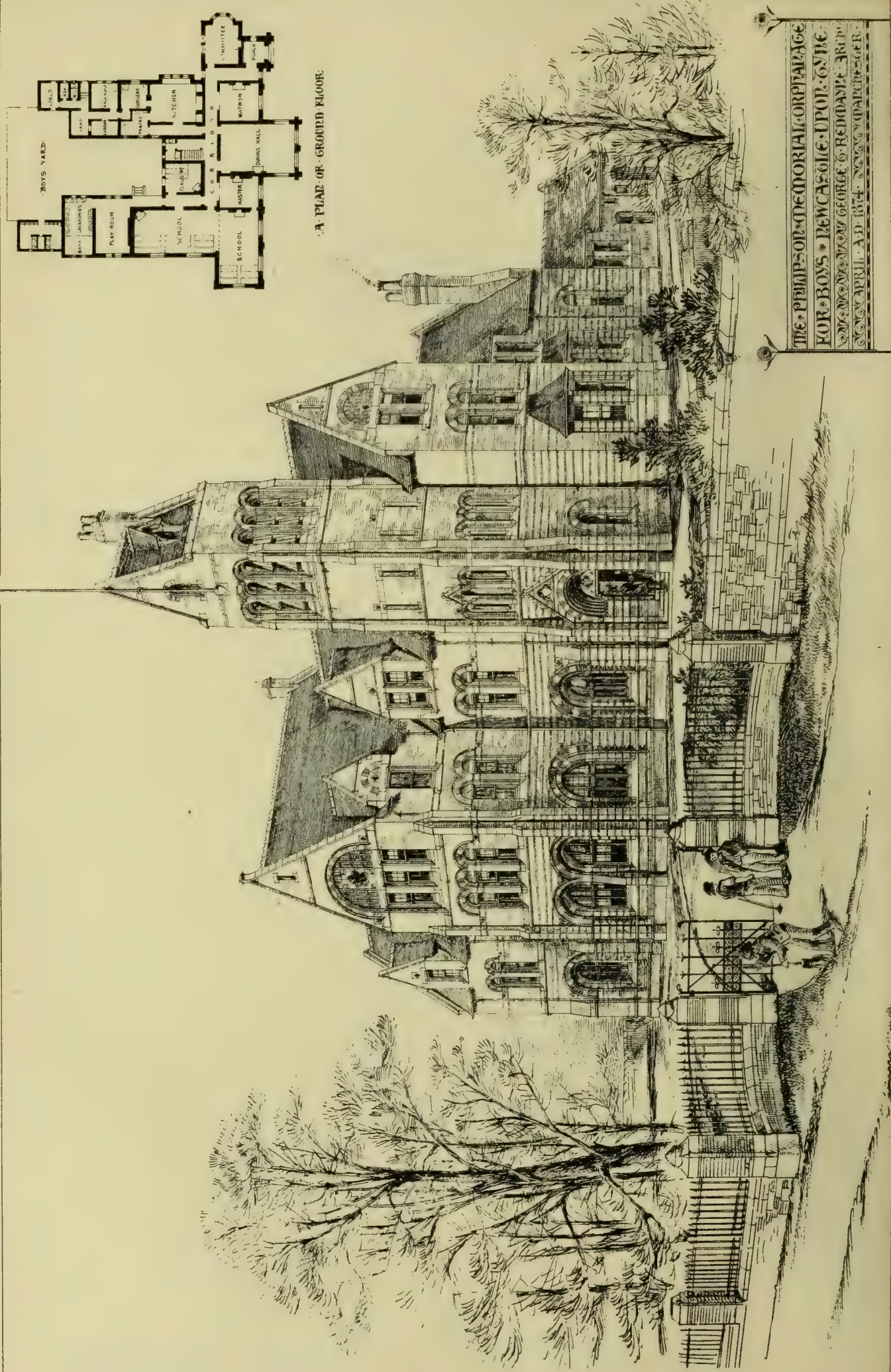
Cut on 1/4 side of cloister  
all the capital heads are  
broken off they have been clear  
from.  
23rd May 1873  
F.R.S.

CAPS IN CLOISTER









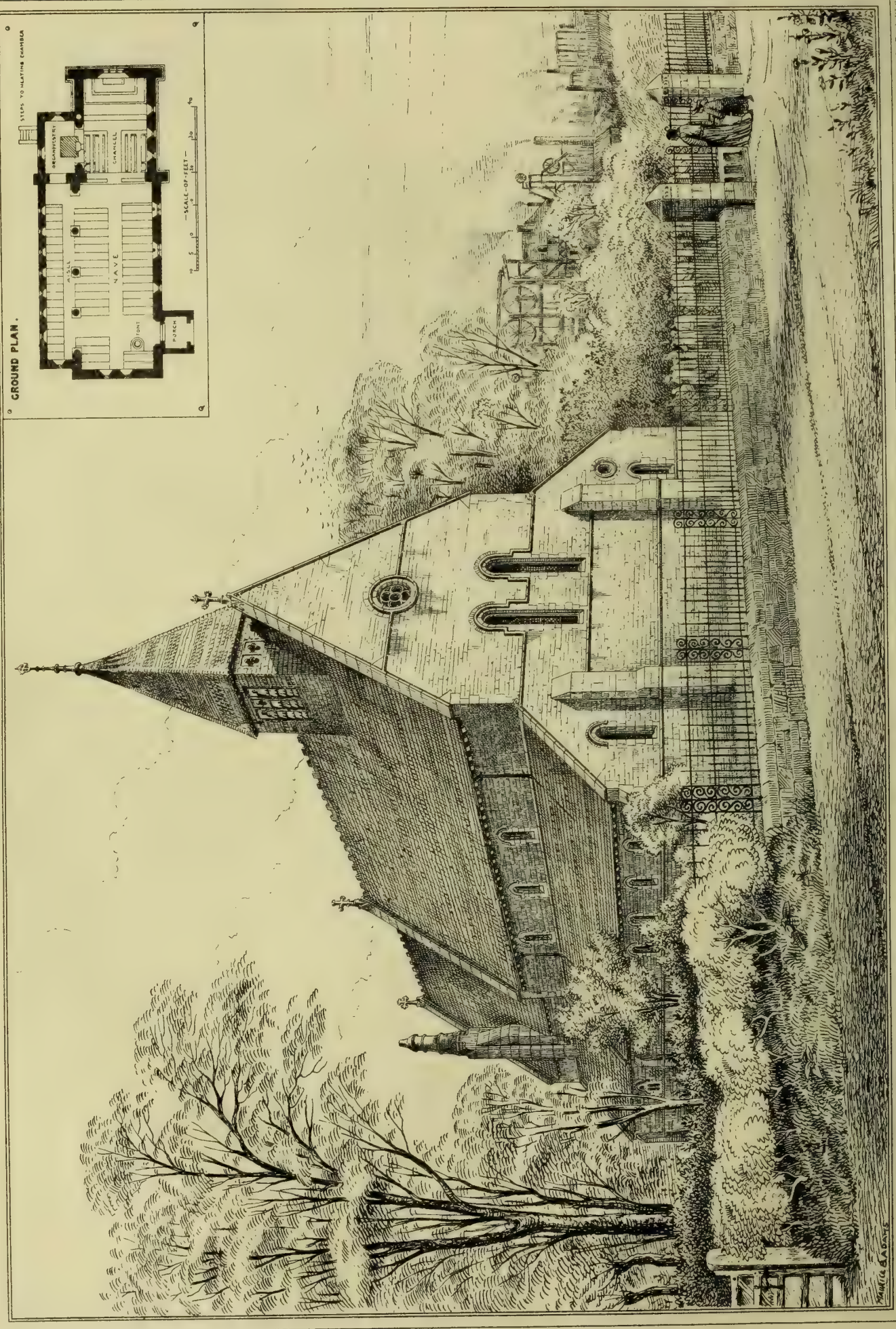
A PLAN OF GROUND FLOOR.

THE PHILIPPS MEMORIAL ORPHANAGE  
FOR BOYS • NEWCASTLE-UPON-TYNE  
DONATED BY GEORGE & REDFERN ARCHT.  
OPENED APRIL 10 1874. ROBERT WATSON





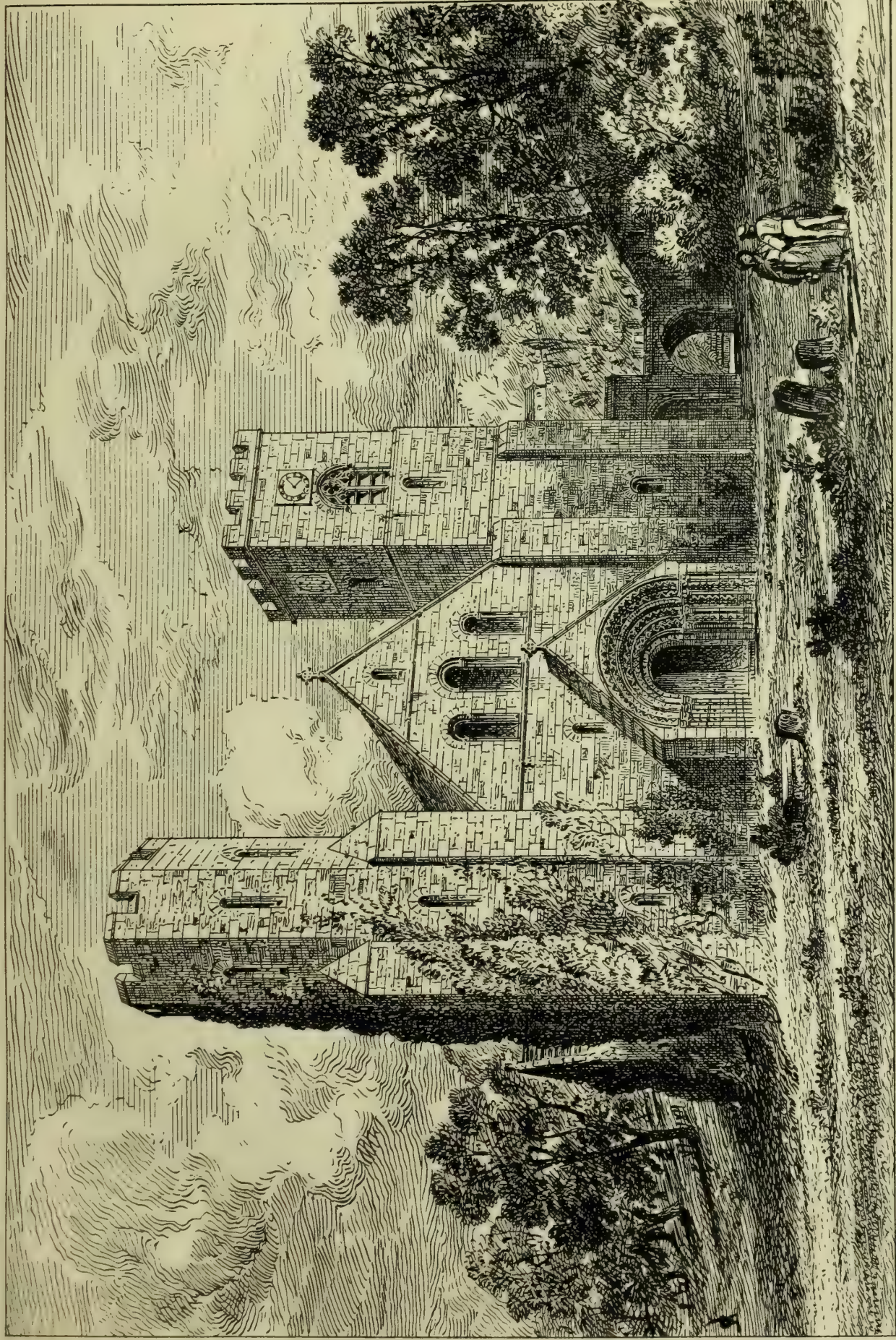




CHURCH OF S. SAVIOUR, MORTOMLEY, YORKSHIRE.  
JAMES BROOKS ARCHITECT.

Photo Lithographed & Printed by James Atkinson, 5, Gray's Inn Road, W.C.





St. Germain's Church, Cornwall

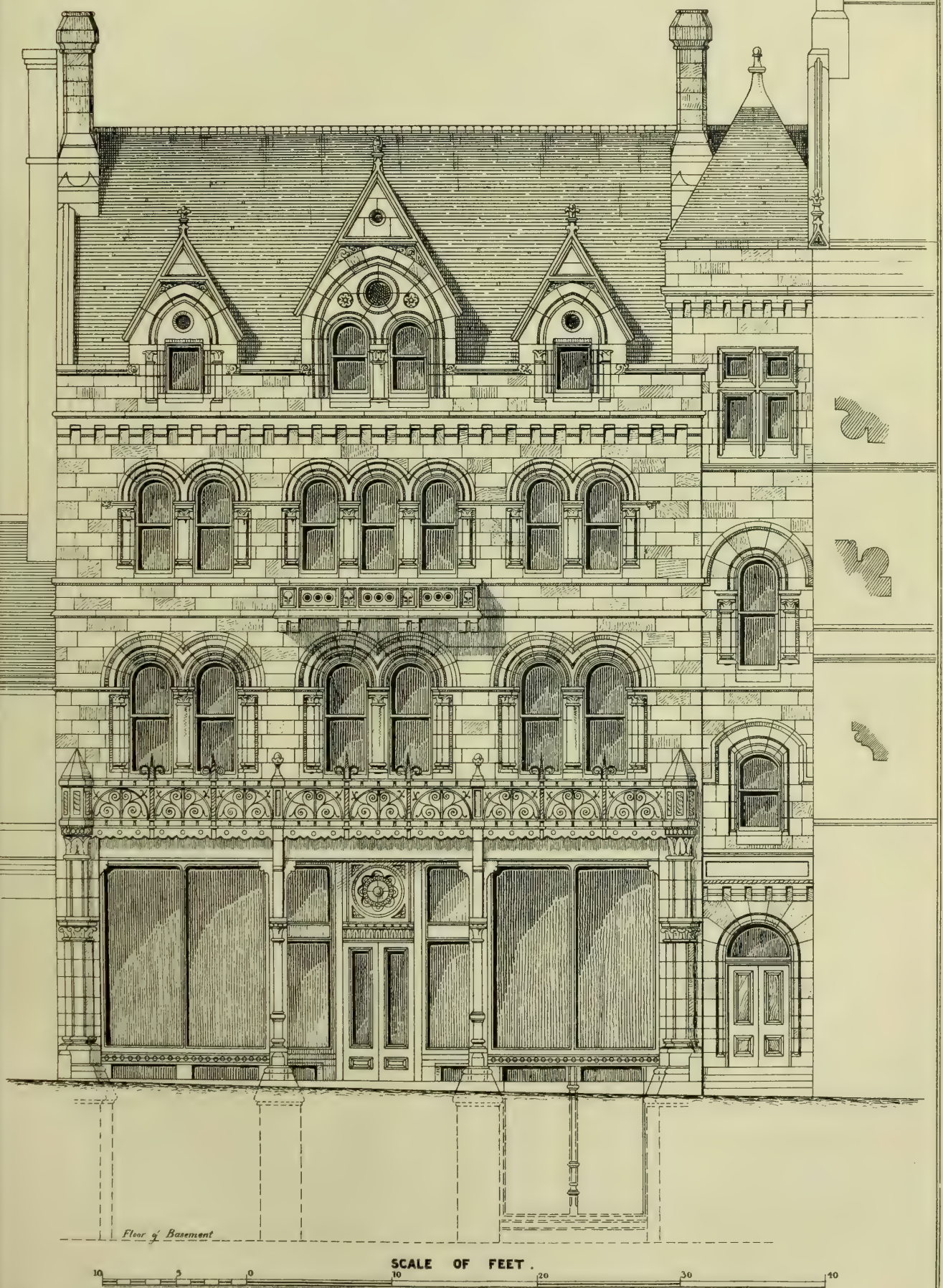
Photo lithograph by James Alderman, St. Giles, London, W.C.







SHOP AND BUSINESS PREMISES PARK ROW LEEDS  
FOR M<sup>r</sup> A. RAMSDEN.

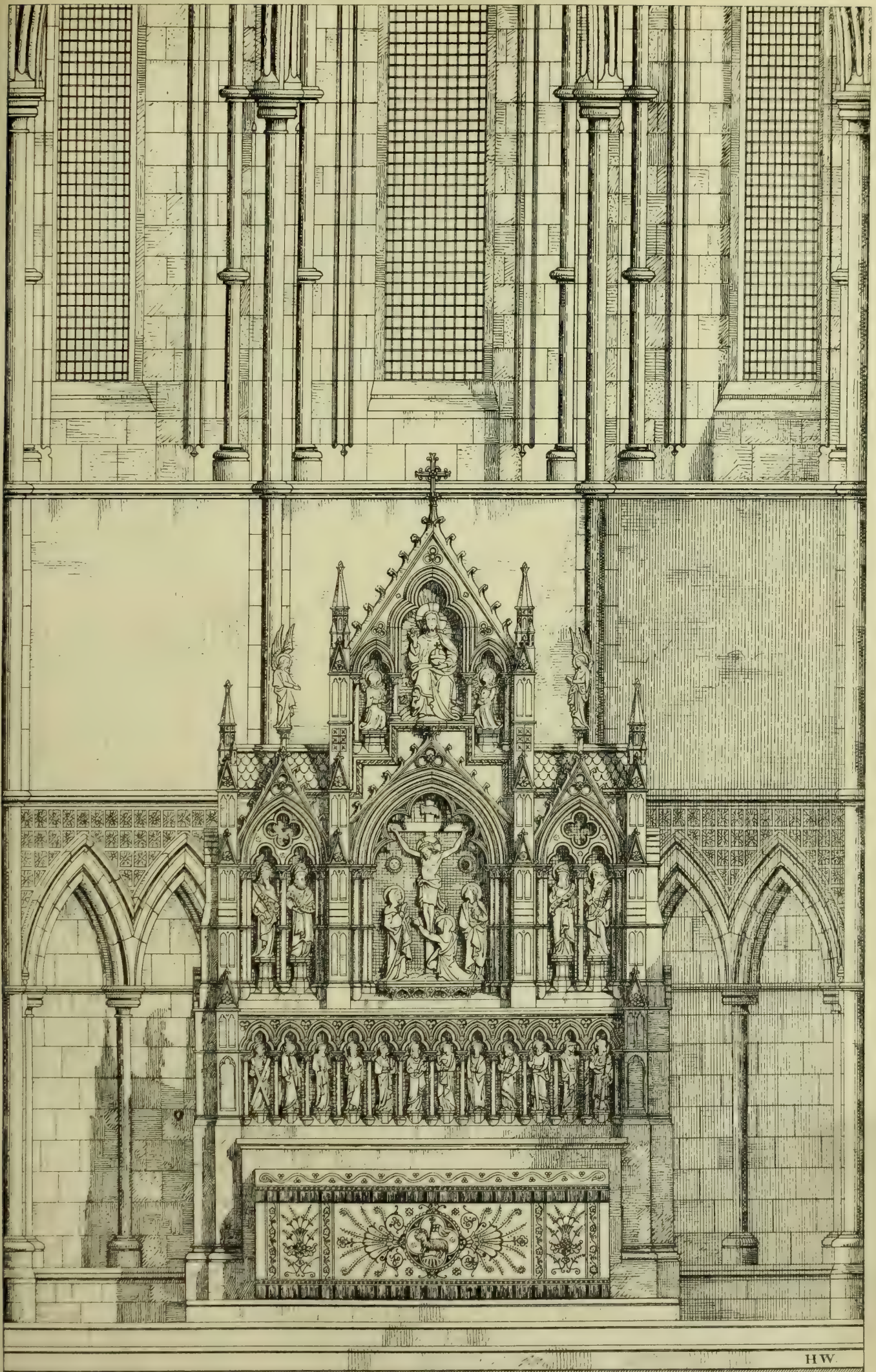


GEORGE CORSON, ARCHITECT.









HW.

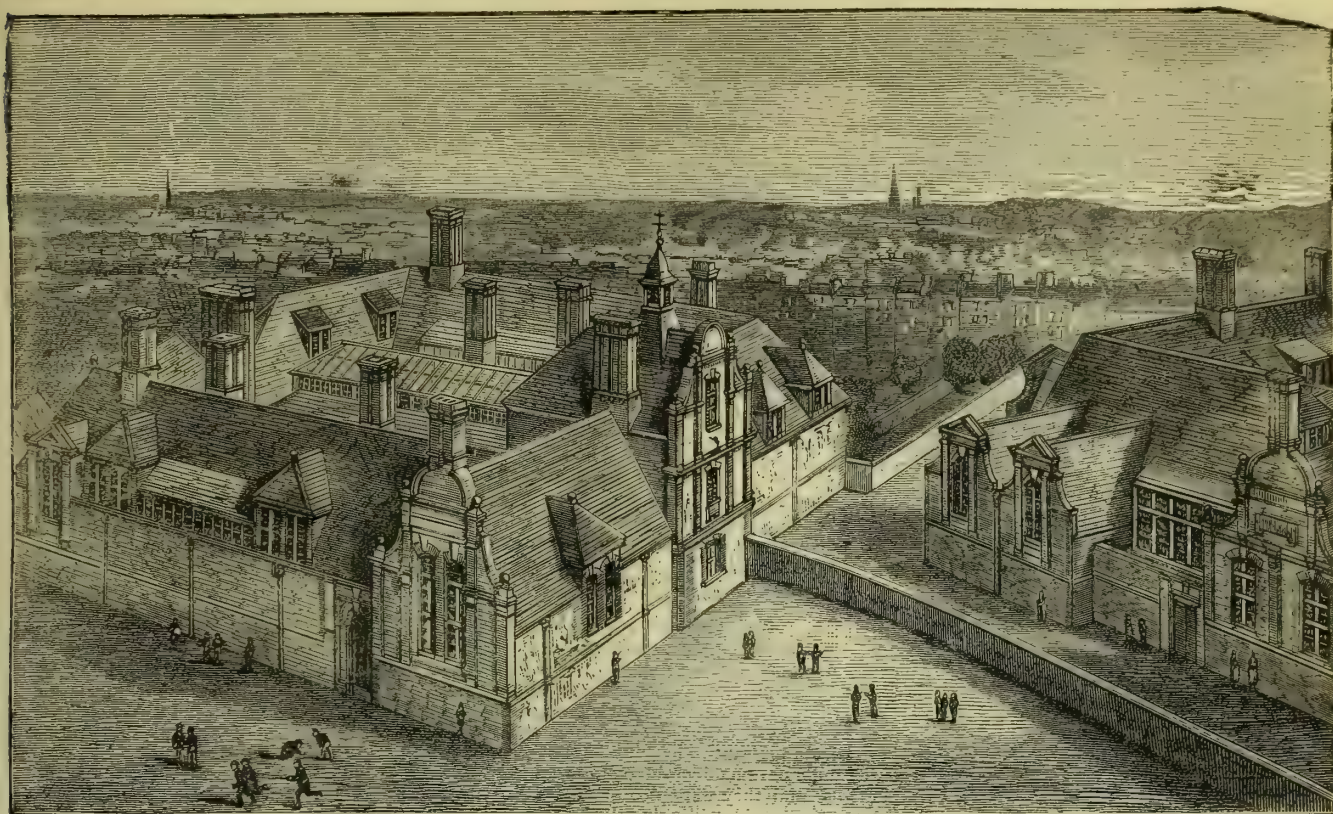
Photographed & Printed by James Akerman & Co. Great Britain Road, A. 1

Reredos. S. Bartholomew's Ch: Armley.

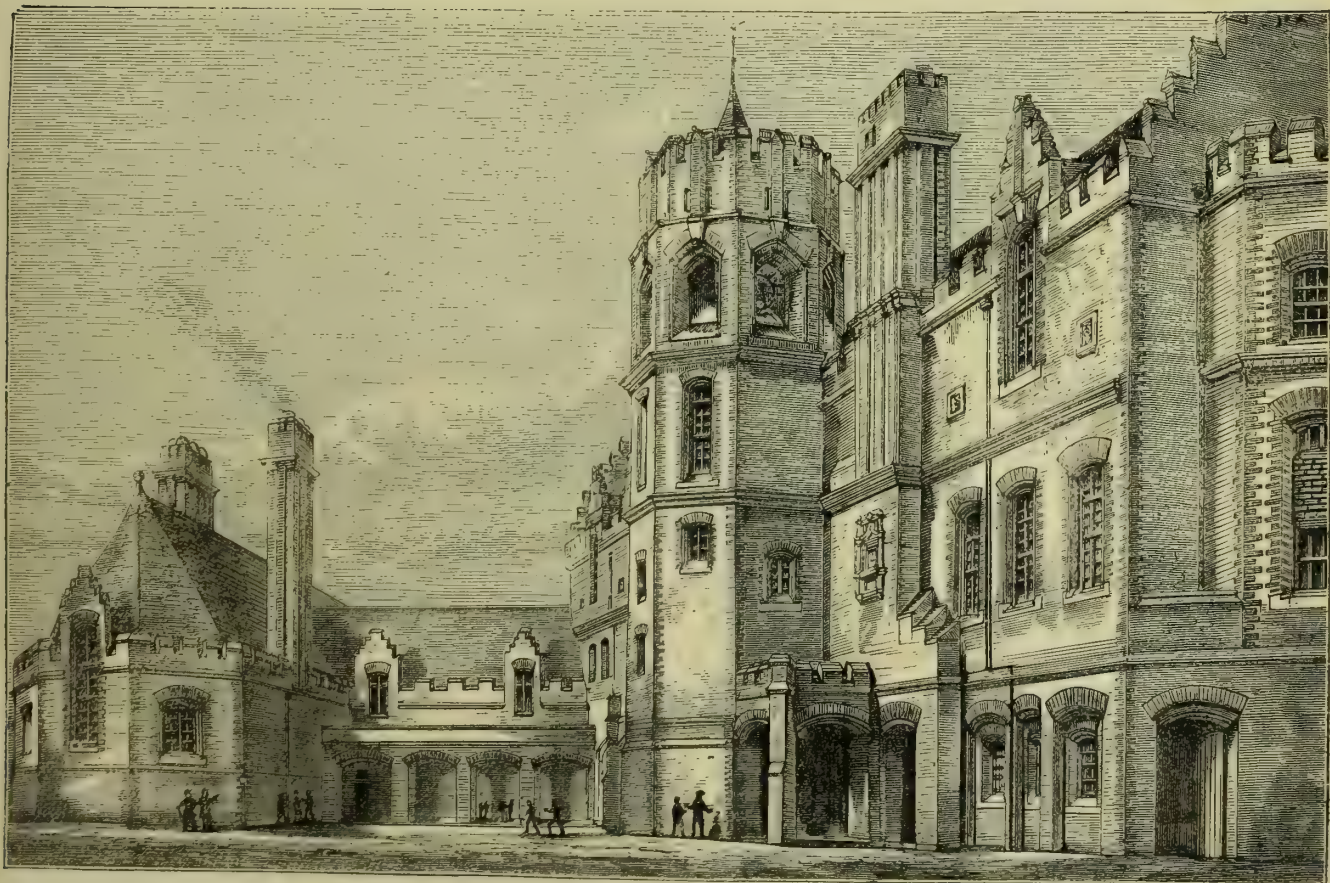








HAVERSTOCK HILL SCHOOL (SEE P. 53).



EAST VIEW OF WINSTANLEY ROAD SCHOOL, CLAPHAM (SEE P. 53).

## ARCHITECTURAL ASSOCIATION.

THE annual dinner of this Association was held on Friday evening last, at the Holborn Restaurant, 218, High Holborn, Mr. E. J. Tarver, President, in the chair, supported by Mr. G. H. Birch, President elect, and the following past-

Presidents: Messrs. William White, F.S.A., Rowland Plumbé, J. Douglass Mathews, Lacy W. Ridge, R. Phené Spiers, and Thomas Blashill. In all, about 70 members of the Association were present. The usual loyal and patriotic toasts were given, Lieutenant-Commanding Ridge, of the "Artists'" Corps, responding for the Volunteers.

Mr. Birch, the President-elect, proposed "Prosperity to the Architectural Association," coupled with the name of Mr. Tarver, who, in responding, said he thought the members of the Association and the junior members of the profession generally were to be congratulated upon the fact that at the recent Conference of Architects the opinion



had been very generally expressed that pupils and assistants should be allowed time and opportunity for seeing the buildings upon the drawings of which they were engaged. The Association had two or three extremely useful Classes, the Class of Design and the Class of Construction, but he had conceived a bolder idea, not by any means an "after-dinner" suggestion—he thought the Association, with its six or seven hundred members, might establish a Class of actual Building. A great deal had been said of late as to improving the usefulness of the Institute, and perhaps one of the ways in which the Institute could add to its utility would be in helping the Association to consummate the idea of a Class of Building. Why should there not be a class in which the best designs submitted should be actually built for the instruction of its members, always supposing that the designs submitted were for small things? Of course a yard or small piece of ground would have to be rented, and there would be the cost of labour and materials from time to time, although the materials might be used over and over again. He merely suggested the idea in this crude form, in the hope that it might be found practicable to carry it out. In proposing the health of Mr. Birch, the President-elect, Mr. Tarver said he felt sure that under the presidency of his successor the welfare of the Association would be fully maintained. Mr. Birch having briefly responded, Mr. Phené Spiers proposed the health of the Vice-Presidents, Mr. J. S. Quilter and E. G. Lee, to whose labours the Association was much indebted. Both gentlemen having spoken in reply to the toast, the Chairman proposed the health of the hon. secretaries for the past year, Messrs. Paice and Clarkson, coupled with the name of Mr. E. G. Hayes, one of the secretaries-elect. The Chairman justly remarked that to the courtesy and business-like manner in which its secretaries discharged their onerous duties the continued success of the Association was mainly due, and it would be impossible to over-rate the value of their services. Messrs. Paice, Clarkson, and Hayes responded. Mr. Riddett proposed "The Past Presidents of the Association," coupled with the name of Mr. William White, F.S.A., who, in responding, gave some particulars of the Church of S. Mark's, Battersea Rise, which a party of the members of the Association visited on Saturday. (For description of this church, see p. 73.) Mr. E. C. Robins, in proposing "The Press," observed that the profession was remarkably well served by the architectural journals, which fairly reflected the architectural opinion of the day. Mr. Boyes, in proposing the toast of "The Treasurer" (Mr. J. Douglass Mathews), paid a well-merited tribute to that gentleman's efforts to promote the welfare of the Association. Mr. Mathews was for many years one of the honorary secretaries, and it was mainly owing to his exertions that the Association had attained its present eminently successful position. Mr. Mathews having replied, the chairman proposed "The Visitors," coupled with the name of Mr. J. J. Stevenson, whose paper on the "Queen Anne Revival," read at the Conference of Architects, is now being so much discussed. Mr. Stevenson, in reply, said he did not know why his name should be associated with the present reaction in taste—for that there was a reaction was indisputable. A previous speaker had referred to the old feud between Classic and Gothic, but he believed that was entirely a thing of the past, and that all architects, whatever their predilections as to style, were now simply striving to do one thing, and that all questions as to what style was best in itself would resolve themselves into deeper questions, viz., which was the style which architects could best carry out for modern purposes? Which was the style which they could employ not only on the outsides, but in insides of their houses? He could not understand why his paper read at the Conference, which contained propositions which he considered to be axiomatic, should have created so much excitement. The last toast of the evening was "The Committee and General Officers," proposed by Mr. Hazlehurst, and associated with the name of Mr. Ravenscroft, who responded. The enjoyment of the evening was considerably enhanced by songs by Messrs. Dollman, Stannus, Lee, Hunter, Riddett, Hayes, and Hazlehurst; and Mr. Hebb contributed in no small degree to the mirth of the evening by reciting in a very able manner two of (if we mistake not) Mr. W. S. Gilbert's "Bab Ballads," illustrated with some cleverly executed coloured caricatures to a large scale.

## ON THE INFLUENCE OF THE ITALIAN CINQUE CENTO ON THE EARLY FRENCH RENAISSANCE.\*

(Concluded from page 6.)

THERE is a small but elegant, and, for England, almost unique example of Early Renaissance at Tiverton, in Devonshire, in a chapel built by John Greenwaye, a merchant, dated 1515. The style of this work rather suggests that French hands were employed in its execution. Returning to the Renaissance of France, about the year 1530 Francis I., whose military excursions into Italy, although unsuccessful, had given him a strong feeling of admiration for the arts of that country, invited the artists Rosso and Primaticcio, and subsequently Serlio, and Benvenuto Cellini, into France, which gave a new impulse to the style, which was soon exhibited in the Hotel de Ville in Paris, the chateaux of Fontainebleau, Chambord, and that named Madrid, and the Chateau Gaillon, both near Paris. The former, Chateau Madrid, is entirely destroyed; of the Chateau Gaillon only a screen which was built forming one side of the court remains, and is preserved in front of the Palais des Beaux Arts. This monarch also built the Palace of Chenonceaux, Valley Verneuil, and the unfinished Chateaux of Charleville and Ecouen. From the names which have been preserved of the architects of these buildings it does not appear that any of the great Italian artists above mentioned (to whom must be added the great name of Vignola) were immediately engaged upon them, unless, perhaps, Serlio in the case of the Louvre; but their presence in France by invitation from the king must have had considerable effect upon the designs, and they were doubtless men of judgement, who would willingly fall in with the requirements of the national feeling, and the conditions peculiar to these buildings, for the most part situated in parks, visible on all sides, and not, like the Italian palaces, mostly confined to streets in towns, the chief feature in these palaces being their towering roofs, ornamented with tier upon tier of dormer windows and turret staircases of the most picturesque character. There are still other beauties in the shape of doorways and window dressings, ornamented with great delicacy to satisfy the eye on nearer approach. At this time (about 1540) France possessed two native artists of the very highest character, Bernard Palissy and Jean Goujon. The former turned his talents chiefly to ceramic products, and is therefore outside our present inquiry. The latter, if not himself known to be the architect of any buildings, is known to have added to them their greatest charm. His sculptures in the great court of the Louvre, and his Fontaine des Innocents, which was recently removed and its character injured by the restoration, but, happily, well photographed before what may be called its destruction, puts Jean Goujon on the very highest pinnacle of merit as a Renaissance architect and sculptor. The noble painted windows of the chapel in the Chateau of Vincennes were executed from his cartoons. I have not been able to find the date of his birth, but that of his death is clearly marked, for he was shot, whilst working on a scaffold, at the Massacre of S. Bartholomew, in 1572. I may conclude this list of French Renaissance works with two more, the Hotel de Valois, at Caen, now the Bourse, and the great court of the Louvre. The former, though not large, is one of the most graceful buildings of the more picturesque class, such as Chambord and Blois, with quaint dormer windows, and the combination of sculptured figures of heathen and Jewish worthies, with fine arabesques by the same hands, no doubt, which a few years earlier had finished the neighbouring church of S. Pierre) is extremely pleasing. For the great court of the Louvre, Francis I. invited designs from Serlio, and he probably considerably influenced the design, for one cannot but think there is the feeling of Bramante in it. It is purer than those works before mentioned, where the French character had more scope. Whatever Serlio may have done, however, the actual architect was Pierre Lescot. The architecture of this palace is of so high and pure an order, bringing the delicate Italian feeling into a rather robust growth, as suited to northern latitudes, that it is one to which our attention should be particularly turned, because there is a considerable

danger lest in using so malleable a style as the Renaissance, we should be led to indulge in license, as our school is very much too apt to do. We find abundance of freedom, but still wholesome restraint, in this great palace, and I may very properly, as I have here indicated an example which we should follow, point out the converse what to avoid, and quote a warning which comes from the able pen of Sir Digby Wyatt:—"In conclusion, it remains for us only to invite the student to cultivate the beauties as sedulously as he should eschew the extravagances of the Renaissance style. Where great liberty is afforded in Art, no less than in Poetry, great responsibility is incurred. In those styles in which the imagination of the designer can be checked only from within, he is especially bound to set a rein upon his fancy. Ornament let him have in abundance, but in its composition let him be modest and decorous, avoiding over-finess as he would nakedness. If he has no story to tell, let him be content with floriated forms and conventional elements in his enrichments, which please the eye without making any serious call upon the intellect; then, where he really wishes to arrest observation, by the comparatively direct representation of material objects, he may be the more sure of attaining his purpose. In a style which, like the Renaissance, allows of, and indeed demands, the association of the sister arts, let the artist never lose sight of the unities and specialities of each. Keep them as a well-ordered family, on the closest and most harmonious relations, but never permit one to assume the prerogatives of another, or even to issue from its own to invade its sister's province. So ordered and maintained, these styles are noblest, richest, and best adapted to the complicated requirements of a highly-artificial social system, in which, as in that of the Renaissance, Architecture, Painting, and Sculpture of the highest technical excellence in industry, must unite before its essential and indispensable conditions of effect can be efficiently realised." (Text to Owen Jones' "Grammar of Ornament.") In conclusion, Mr. Penrose referred to the photographs exhibited from the Renaissance windows of Conches, which he strongly recommended to the attention of any who may be making a tour of Normandy, together with some that seem to be by the same hand at Pont au de Mer. The artist who designed these windows was one Aldegraver, a pupil of Dürer. Mr. Penrose also called attention to the "Handbook to the Renaissance Court of the Crystal Palace," by Sir D. Wyatt and Mr. Waring.

Mr. H. H. STANNUS, A.R.I.B.A., in proposing a vote of thanks to Mr. Penrose, said that the paper was especially opportune at this time, when the Renaissance styles appeared to be re-asserting their claims, and when the Valley of the Loire was resorted to during sketching tours. It appeared to him that the development of the style was due to personal predilections on the part of French monarchs, and the fashion once set in Paris, was eagerly copied in the provinces. The military expeditions into Italy led by Charles VIII., Louis XII., and Francis I., enabled those monarchs to see the palaces and churches which were being erected in Italy in the newly-perfected style of the Cinque-Cento, and they probably admired it for its sumptuousness and suitability for the display of the wealth which was then increasing in Europe. Francis I. was known to have invited Italian artists to France, and they soon engrafted the elegant and fanciful detail to which they were accustomed on the constructive forms of the expiring Flamboyant, and it was not long before the fashion became systematised into a style, examples of which were to be seen at Paris, Rouen, Dijon, Fontainebleau, and elsewhere. It was, however, introduced as a fashion by the followers and courtiers of the monarchs, and perhaps, if Francis I. had "looted" the Summer Palace at Pekin, we should have had Chinese instead of Italian details in François Premier architecture. It was interesting to note how some of the carved architectural details of the Renaissance appeared to have been derived from metal work, and how, in consequence, they appeared incongruous and out of place in stone. At S. Pierre, Caen, the pinnacles above the flying buttresses were evidently mere reproductions of the forms and details of bronze candelabra. The buttresses themselves were panelled in front with light ornament, such as that on the pilasters of the tomb of Louis XII. Such ornamentation was more suitable for repoussé work or casting than for stone, in which latter material the ground had

\* By F. C. PENROSE, F.R.I.B.A. Read before the Architectural Association on the 26th ult.



to be sunk at considerable expense. The colonnettes and balusters were also carved with the detached scrolls which were so easily soldered on in metal work, but were quite unsuitable in stone. The "nulling" of the egg-shaped parts was also evidence of a repoussé origin. Other of the carved details appeared as if the architect had laid painted decoration as well as metal-work under contribution for details, in the feverish anxiety to cover his work with ornamentation. Some of these were of a character requiring colour, and were quite ineffective in a material like stone. The new S. Stephen's Club, Westminster Bridge, gave a very good idea of the style, and appeared to have been carried out with a conscientious regard to the details of the Chateau of Ecoville for the main building, dormers, and roof; and of the Chateau de Pailly for the balcony. This building was worthy of study as reproducing some of the details which might, perhaps, be more modified for our English climate. The drawings of these and other chateaux of the same period were to be found in Sauvageot's work, and exhibited the struggle between the perpendicular lines of the buttresses (transformed into successive orders of pilasters with the entablatures broken round each) and the horizontal lines formed by the entablatures and string-courses. The effect of this breaking-up of the façade was to give a "busy" and far from pleasing appearance to the composition, and the culmination in a flower-pot at the summit was something like bathos. Nevertheless, the style, as seen in the Louvre, and later buildings, was capable of very beautiful effects, and when practised with reticence in the ornamentation, it might be made very dignified and suitable to any purpose for which architecture might be required. The eccentricities of the architecture of the period arose in part from ignorance and want of simplicity, and in part from the desire of each architect to outdo his compeers and to make his buildings different to theirs, so that they might be known as *his*, instead of doing the best he could for his work. In Gothic work, in many cases we did not know the name of the man whose work we admired; but in Renaissance the architect always took good care not to be forgotten. In the times when progress was made in Gothic architecture, the man was nothing and his work everything, and each man was content to take the sum of the work of his predecessors and imitate it, merely improving the construction and altering details where his wider experience suggested improvement; and the result was a gradual improvement through some centuries. In the Renaissance, however, each man seemed to have endeavoured to advertise his individuality, and the result was that the style died out, or was smothered under the Rococo, and ceased to be noble architecture in a very few years. The revived Classic style, as practised with moderation, had been very successful in France during the last few years, and Mr. Penrose's paper would have the effect of recalling the younger men's attention to it. He thought the Association should also tender its thanks to Signor Brucciani for the loan of the casts from the tomb of Louis XII.

Mr. RAVENSCROFT seconded the motion, which was supported by Messrs. G. H. Birch, S. F. Clarkson, Aston Webb, and carried by acclamation, and Mr. Penrose briefly replied to a few questions which had been put by some of the speakers.

Votes of thanks to the retiring President and Secretaries concluded the business of the Session.

#### MOISSAC.

**T**HOUGH the two caps illustrated this week be too small a text to write on them a complete history of the ancient and celebrated abbey in whose cloister they stand, yet some short account of Moissac may not prove altogether without interest.

Concerning the original foundation of their monastery, the monks were long fond of recounting how Clovis, about the year 507, first established it. Their story was that Clovis, after the battle of Vouillé (506), and his victory over Alaric, went to Toulouse, the capital of the latter, to take possession of the treasure of the king of the Visigoths, and that during this journey the religious were established at Moissac to the number of one thousand, which the Baron de Crazanne says must have been more like a colony than a convent.

A local tradition reports that Clovis, having by

an ambush lost in a valley in the neighbourhood many of the bravest of his warriors, founded this monastery in their memory, and that the monks might pray for the rest of their souls. A valley is still shown called the Val Enganne, which may mean the deceitful valley, from the Italian *engannare*—*ingannare*. The truth appears to be that Clovis came not hither—Teodoric, his natural son, commanding the wing of the army in this district. This Teodoric, or Thierry, was defeated before Arles by Abbas, General of Theodoric, King of Italy. This was nearly the only defeat Clovis suffered in his reign.

The foundation of the Abbey is also ascribed to S. Amand, Bishop of Maastrick, in the seventh century, during the reign of Clothaire II. S. Didier, Bishop of Cahors (his name Desiderius was later corrupted to S. Géri), increased the riches of the community, and sovereigns, lords, and rich commoners, as years rolled on, added their gifts. Among such, Louis le Debonnaire deserves especial mention. The town which rose round the abbey of S. Pierre was at first called by its name. Of the church built here in the eleventh century nothing now remains but the very magnificent portal and lower part of the west tower. The cause of the ruin of the other portions of the church is unknown; it most probably was fire or some violent destruction. The existing church, which appears to be of the fourteenth century, is raised in great part on the old foundations.

The cloister is one of the most celebrated in the south of France—some writers have not hesitated to rank it as the finest; but though its capitals and the alternation of its columns are very beautiful, I do not consider that, taken as a whole, it equals either the cloister at Elme, or that of Arles, in Provence. It lies on the north side of the church, and forms a complete rectangle. There are in it 116 columns, alternately coupled and single, besides eight piers, the interior faces of which are veneered with red and white marble slabs from the Monticoux quarries. On these are carved, in low relief, the Eleven Apostles and S. Durand, S. Paul taking the place of S. Matthias, and S. Simon being omitted. A curious story is told to account for the latter fact. The abbots of Moissac appear never to have been on good terms with the bishops of Cahors, but maintained that they were independent, and that they held their monastery direct from Rome. Now, we find an inscription remaining in the church relating to the consecration of the first fabric. It is as follows:—

"Idibus octonis domus ista dicata novembris;  
Gaudet pontifices hos convenisse celebres;  
Auxius Ostindum; Lactora dedit Raimundum;  
Convenerunt Wilelmum; dixerit Aginna Wilelmum;  
Jussit et Heraclium non desse Beorra benignum;  
Elloreus Stephanum concessit et Adura Petrum;  
Te Duranne, suum, nostrumque Tolosa patronum;  
Respuitur Fulco Simonis dans jura Cadurco;  
Myriades lustris apponens, tres duodenis;  
Virgineum patrum dabat orbi tunc venerandum  
Hanc tibi, Christe Deus, rex instituit Clodoveus  
Auxit magnificus post hunc donis Ludovicus."

Here we find Foulques of Cahors, in whose diocese Moissac was, and who should therefore have presided at the ceremony, not only not present, but "respuitur;" while S. Ostende, of Auch, Raymond, of Lectoure, and six other bishops, are all invited, and assisted. The Bishop of Cahors appears to have been objected to for fear he should afterwards claim to be patron of the abbey, which wished to maintain itself directly dependent on that of Cluny. As for the name, "Fulco Simonis," in the inscription, it appears to mean only, "Foulques, son of Simon," though some authors have considered "guilty of Simony" to be the true interpretation (see *l'Histoire du Quercy*). It seems unlikely that the monks would have dared, during the life of Foulques, to write thus of him; but there may be a double meaning in the words, and the omission of S. Simon from the Twelve Apostles in the cloister is a strange coincidence, especially when we consider that S. Durand is put in his place.

This same Abbot Durand de Brédon, of Moissac, had been a monk of Cluny, and became afterwards Bishop of Toulouse, as stated in the above inscription. Though canonised after his death, he appears to have been not altogether without his faults; for S. Hugues, Abbot of Cluny, in the time when Durand was a monk there, blamed him one day for that he did naught but "gausser" (in modern English, to chaff), and

warned him that unless he corrected himself of this habit his lips after death would be swollen and his mouth filled with slime. He appears to have died with his fault unamended, for his spirit was seen by one of his monks, Segain by name, even in that same sad plight S. Hugues had predicted. The latter having heard of it, and having compassion on him, ordered seven monks to hold their peace till by their penance he should obtain relief. Need it be added that before long he appeared to one of the silenced seven and reported himself as cured.

On one of the cloister piers is the following inscription, beautifully carved, the letters being, as was usual at the time, placed over, and in, one another:—

ANNO . AB . INCARNA-  
TIONE . ÆTERNI .  
PRINCIPIS . MILLESIMO .  
CENTESIMO . FACTUM .  
EST . CLAUSTRUM . ISTUD .  
TEMPORE .  
DOMINI .  
ANSQVITILII .  
ABBATIS .  
AMEN .  
V . V . V .  
M . D . M .  
R . R . R .  
F . F . F .

The latter four lines have given rise to much conjecture. M. Laroque suggests: "Venerabiles Monachi Domus Religiosi Fratres." But M. Lagrèze Fossat seems to be more ingenious in rendering them thus:—

Venerabili Virgini Virginum  
Mariæ Dei Matri  
Reverendissimi  
Fratres.

Although Ansquitilius is named as being Abbot when this cloister was made, its construction appears to have lasted from 1100 to 1108, and been finished in the time of the Abbot Roger, who succeeded Ansquitilius. In fact, the arches and upper part of walls would appear to be of a much later date. They are of brick, plastered, and so plain that it is difficult to imagine they can be of the same date as the richly carved capitals. Most likely they may only remount to the disasters of the religious wars. In a plate published in 1833, the cloister walks are shown covered with a plain wooden waggon vault, much decayed. This has now been replaced by a modern roof and ceiling. Fountains are to be found at an angle of many of the Southern and Spanish cloisters, and one existed here, but so far as my memory serves me is not now visible.

One word with regard to the sketches of caps published herewith. They are simply rough notes taken on the spot. When on a tour, and surrounded with so many beautiful things to be studied, time is too short to spend any of it in trying to do more than to seize the ideas of the old workers, and the facts of the work they have left us. General effect, or indeed effect of any kind, I have not aimed at, these notes not being made to show to others, but to assist my own memory. Nevertheless, I believe they possess a certain value in that every line was drawn with the old work before me.

F. C. DESHON.

#### THE CHURCH OF S. MARK, BATTERSEA.

**T**HIS church, now in course of erection from the designs of Mr. W. White, at Battersea Rise, was not without some special points of interest to a few of the members of the Architectural Association who paid it a visit last Saturday. It is a cheap church; it departs from the general mode of construction in one or two particulars; and if it is not altogether our ideal, it possesses some points of merit worth mentioning. The plan consists of nave 79ft. 4in. by 24; side aisles, 8ft. 6in. wide; choir, 40ft. 6in. in length, rather narrower than the nave, with a surrounding aisle leading to a crypt underneath the choir. Slight transeptal projections give, on the north side an organ-chamber and vestry and vestry entrance; and on the south side a narrower recess is appropriated to 85 children. The chancel terminates as a chevet, and is of five sides, or semi-decagonal, the angles made with the rectangular walls of chancel being barely visible externally; too slight, we think, for external effect, or for roofing, but adding greatly to the visible length of the church, and probably to acoustic effect. The entrance at west end is by a narthex open-



ing on its south end, the portion opposite the west doorway of church being marked by the walls being inclined so as to form an angular recess or lobby. On the north side another entrance is provided by a porch. The total length of church between walls is about 130 ft. The plan provides accommodation for over 600 persons. The style adopted by the architect is of an Early French Gothic type. The aisle windows are short, and of three lights, embraced under a flat pointed segment. The heads and cills only are of Bath Ground stone, the jambs, mullions, and arches being of red brick, moulded from the designs of the architect. Considerable effect is obtained by a hollow carried round the whole window in the angle formed by the external brick reveal and the face of mullions. It is questionable, however, whether the stopped hollow in the centre of the face of the moulded mullions answers any good purpose. We should have preferred the effect infinitely better without. The windows of apse are two-light, the heads filled-in with cinque-foiled heads of stone, and their effect is pleasing. We cannot speak so well of the west wall, which is extremely heavy, and relieved only by two high lancets. The main lighting is obtained through the large two-light clerestory windows, but a little more window-surface would not have been overdoing it. The apsidal end of the structure struck us as being successful, though we cannot say so much for the west end.

Mr. White has given us a rather bold departure from precedent in placing his clerestory windows out of centre with the arches of nave, so that the piers and wall shafts come, in some instances, over the openings below. If this variation from the ordinary construction possessed any constructive or artistic merit there would be little to object to in the innovation, and, indeed, we should see no objection in the present instance if such a mode gave any great facility in construction, or an advantage in the spacing of the roof trusses; but when we find there is no law followed in the spacing—that, in fact, the centres of clerestory windows are not coincident with the centres of nave arches, but that a constant variation of position is allowed, the irregularity becomes questionable, if not verging on the presumptuous. In a high clerestory such as we have in this church, to say nothing of artistic considerations, this great inequality of spacing, and therefore weight upon the backs of nave arches, is certainly better avoided. We have seen examples of clerestory openings placed centrally over the pillars below, the piers being exactly poised upon the apices of arches, and there is no constructive objection to this provided there be ample abutment, in fact, a pointed arch admits a heavier load at the crown than other kinds of arch.

In the construction of the walls Mr. White has boldly, and, we think, successfully, in face of objections entertained by the Ecclesiastical Commissioners and the Metropolitan Board of Works, employed concrete. The facings are only of 4½ in. brick, a concrete core or filling-in forms the bulk of the walls, which are bonded by through-courses every fourth course. The external walls are 2 ft. 3 in. and 3 ft. 3 in. in thickness. The roof trusses are of rather novel design. Each principal is supported by two struts, one springing from a circular-cut piece, forming the bottom end of king post, and the other higher up the king post. The tie-beam, which is of large scantling, is bolted and suspended to the king. At the junction of upper struts a collar is introduced. An upright piece of timber, resting upon the end of the beam, assists in supporting the lower purlins, underneath this being a rolling strut and wall post. All the timbers are straight and only chamfered, the joints being mortise and tenon fixed with trenails. The truss is really a high-pitched king-post roof, with two tiers of struts. The tower, which is low and capped with a low pyramidal shingled roof of timber, is at the south-west corner, and occupies the westernmost end of the aisle. The roofs are plastered internally between timbers, and between the plaster laths and the tile battens, which are nailed to diagonal strips, a pugging of plaster intervenes. The floor will be paved, the chancel being laid with Minton's tiles, seven medallion subjects being introduced in this part. The reredos, which will be of carved oak, is a carved framed cross with ornamental spandrels or corner pieces.

A brick-groined crypt is formed below the choir, approached by steps in the aisles of apse. One novelty is the mode of heating adopted.

A warm-air chamber beneath the organ recess, in which is placed a kind of gill stove, communicates by a sort of double horizontal flue, 3 ft. square, with grated ends, the under flue admitting cold air, which, after passing through the warm chamber, escapes into the church by two gratings. The warming by this means is said to be efficient, the architect having adopted the same plan with success elsewhere.

Externally the church is built in white stocks with red brick dressings, relieved along the upper surfaces of walls by red-brick patterns and diapers. The buttress weatherings are of splayed red-brick courses. The tiles and string-course bricks are from Bridgwater and near Hull; the moulded bricks from Aylesbury. Blue Pennant stone is about to be substituted for the moulded brick shafts of the nave arcade. The work has been well carried out by Messrs. Gregory, of Clapham Junction, the builders; Mr. William White, F.S.A., of Wimpole-street, being the architect. The contract for the church was £5,040.

## Civil Engineering.

### ON STAKING OUT RAILWAY CURVES.\*

WHEN two points in a curve are known, it is required to find intermediate points. This is best done by means of versed sines.  $DH$  in Fig. 1† is the versed sine of the arc  $BDC$ , and  $DH$ , or versed sine, was there proved equal to radius— $\sqrt{\text{Radius}^2 - (\frac{1}{2} \text{chord})^2}$ ; thus we may, by continually dividing the arcs formed, calculate the versed sines for each of such arcs. To work a curve into the tangent, suppose the angle point is inaccessible, and it is also impossible to chain a line or take the angles as in Fig. 2†. Fig. 8 will explain. Having chained the arc  $BF$ , it is easy to calculate the angle  $BOF$  and the angle  $BAC$ . Let  $O$  be centre of wrong curve cutting real tangent  $AK$  at  $E$  and  $K$ . At  $F$  draw a tangent which shall be parallel to  $AK$ . From  $F$  draw  $FH$  parallel to  $AB$ , then angle  $G FH =$  angle  $BAE$ , and  $FH =$  distance  $BC$ , and point  $H$  is end of curve, and  $PH$  is equal to and parallel to  $OF$ , and  $CP$  is equal to and parallel to  $BO$ ; then  $P$  is centre of curve required.



When it is impossible and impracticable to stake out the real centre-line (sometimes it may be in the bed of a river), it is advisable to stake out a parallel, which will be of great service to the engineer who is superintending the construction of the works.

**PRACTICAL NOTES.**—Pegs should be driven in at every chain; at the end of every furlong a difference should be made in the pegs, two being driven instead of one. At the commencement and end of every curve three pegs should be driven in, and it is well to note in a book the exact chainage of all tangent points and other data of service. The book should be kept like a survey-book, and give the points where all hedges or other objects cut the centre. The following is a specimen page:—

Straight.	4-62	Hedge
	4-60+20	Hedge
	4-55+52	T point
24 chains rad.	4-50+12	Wall
	4-46	Ditch
	4-42+6	Hedge
	4-40+10	T point
Straight.	4-35	Hedge
	4-34+6	T point

As soon as the line is staked it should be nicked, so that it is easy to trace the course, and in order

\* By G. W. WILLCOCKS, Assoc. Inst. C.E. Read before the Civil and Mechanical Engineers' Society. Concluded from p. 598, Vol. XXVI. (May 29, 1874).

† For these figures see *Building News*, May 29, 1874.

to save time in tracing the working section. All pegs should be preserved as well as possible

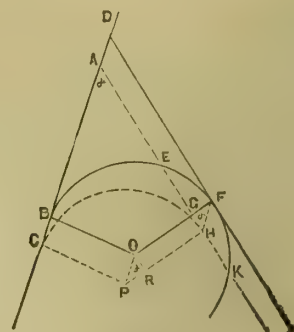


FIG. 8.

during the progress of the work. If this cannot be done, they should be transferred. This would save much time when it is required to give the centre for the platelayers.

### THE INSTITUTION OF CIVIL ENGINEERS.—

For some of the original communications read and discussed at the ordinary meetings of this society during the past session the Council have awarded the following premiums:—Telford medals and premiums to Bindon Blood Stoney, M.A., Richard Christopher Rapier, and Joseph Prestwich, F.R.S., for their papers "On the construction of marine works with artificial blocks of large size," "Fixed signals of railways," and "Proposed Channel Tunnel;" Watt medals and Telford premiums to Alexander Carnegie Kirk and George Wightwick Rendel for their papers on "Mechanical refrigeration" and "Gun carriages;" the Manby premium to Leveson Francis Vernon Harcourt, M.A., for his "Account of Alderney Harbour," and Telford premiums to Major James Browne, R.E., William Douglass, and Joseph McCarthy Meadows, for their papers on "Roads in mountainous tropical districts," "The Great Bases Lighthouse, Ceylon," and "Peat fuel machinery." Miller prizes have also been awarded to the following students of the Institution—viz., James Charles Inglis, Matthew Curry, jun., Walter Young Armstrong, Charles Graham Smith, Alfred Fyson, and Geo. Edward Page.

### CHIPS.

M. Hippolyte Boulenger, one of the best of the Belgian landscape painters, died at Brussels on Sunday.

On Monday afternoon the roof of a workshop, composed of concrete, in course of erection by the Monolithic Company, in Church-street, Islington, fell, burying four men, one of whom was killed and the others seriously injured.

A new Presbyterian church is about to be erected at Houston, N.B., in the Gothic style, from designs by Mr. David Thomson, of Glasgow.

The restoration of Whitechapel Church is to be proceeded with at once. Mr. O. E. Coope, M.P. for Middlesex, has promised to give £15,000 for the purpose.

Plans of an amended scheme for the enlargement of Richmond Cemetery have been laid before the Select Vestry. The dwarf wall which has been the subject of so much contention is to be taken down and rebuilt about 40 ft. to the westward.

Mr. G. B. Richardson has been elected Chairman of the Works Committee of the Metropolitan Board of Works.

The Commercial-road East is about to be re-numbered consecutively throughout. The work will devolve on the local authorities of Whitechapel, Mile End Old Town, Limehouse, and St. George's-in-the-East.

A new Board School which has been erected at Jamaica Level, near Southwark Park, was opened on Saturday. The school accommodates 1,378 children, at a cost of £27,600.

The contract for building the new school at Ware, necessary to meet the requirements of the Education Act, has been given to Mr. Clarke, of Epping. The cost will be about £1,000; and the design is by Mr. Thomas T. Smith, architect, 33, Bloomsbury-square, London.

The Dublin Corporation have accepted a proposal from Sir John Arnott, the proprietor of the *Irish Times*, to cleanse the river Liffey at his own expense.

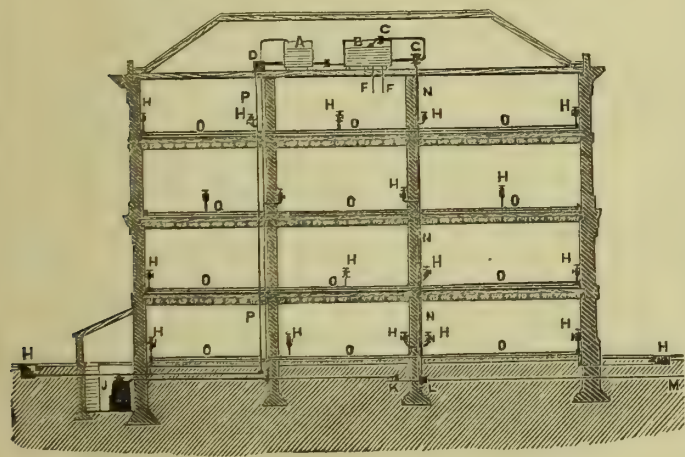
On the 1st instant the foundation-stone was laid at Newcastle-on-Tyne of the new (Roman) Catholic Church of St. Andrew. Mr. Th. Gibson is the architect, and Mr. W. Foggin the builder.



# SMEATON'S PATENT COMBINED HEATING AND FIRE-EXTINGUISHING APPARATUS.

MESSRS. SMEATON & CO., of Fulham, have brought under our notice their new heating and fire-extinguishing apparatus, which we think well worth the attention of house-owners, architects, and all interested in the preservation of buildings from destruction by fire. We believe the patentees have just successfully completed a large contract, amounting to over £7,000, at Hertford House, for Sir Richard Wallace, who is anxious to insure the safety of his pictures and other art treasures. The plan is a very simple one, and consists of a hot-water heating apparatus and cold-water service apparatus, so connected by an ingenious system of self-acting double-action valves that the heating apparatus acts at all times independently of the cold water apparatus, and the latter independently of the former; while at the same time, should a fire arise, and the hydrants be opened at any one or more points, the valves come into instant action, and render available the whole of the water in both apparatus, as also that which may be received from any external force from street mains or other supply; and further, should such force be greater than that obtained from the pressure exerted by the columns of water, the valves adjust themselves, and render the full amount of such extra pressure available.

The advantages to be derived from the efficient action of such an apparatus will be obvious; among them may be mentioned the certainty of having a large supply of water at command the moment an outbreak of fire is discovered, when frequently a few gallons ready to hand would be of far more use than all the engines of the brigade half an hour later; the great facilities afforded by hot water over cold for extinguishing fire, from its disposition to vaporise more rapidly, vapour being more elastic and penetrating than cold water, and therefore more rapid in its action upon flame; and the opportunities afforded of fixing hydrants in every room or passage in the house. The best idea of the apparatus will be gained from the annexed illustration, which shows the section of a warehouse to which it has been applied.



A—Hot-water cistern to act for service and expansion. B—Cold-water cistern; one or more may be used. C—Ball-cock and loop service to cold-water cistern. D—Safety expansion and circulating box in connection with hot-water cistern. E—Self-acting double-action valve, stopping the communication of hot-water to cold-water cistern, and opening to admit supply to heating apparatus. F—Cold-water services for general household or other purposes. G—Self-acting double-action valve to regulate supply and exhaust of cold-water cistern, by which the whole weight of water in the cisterns is available for the hydrants should the pressure be off from the main, while it prevents overflow if the pressure is on. H—Fire hydrants, of any number and in any position. J—Boiler of hot-water apparatus. K—Self-acting double-action valve preventing the cold-water passing into the heating apparatus whilst allowing the water in heating apparatus to pass to cold-water apparatus, and so become available for hydrants on same. L—Self-acting double-action valve retaining the whole of the

water in the cisterns and pipes in case of the mains being emptied, or the pressure reduced below that exerted by the head of water in cisterns. M—Cold-water service from street mains or other supply. N—Vertical service column to cisterns. O—Hot-water pipes, which may be fixed above or under floors and so arranged that they may be heated in sections or altogether as may be required. P—Vertical hot water mains from boiler to safety expansion circulating box in connection with hot-water cistern.

## Building Intelligence.

### CHURCHES AND CHAPELS.

AMPLEFORTH.—Messrs. Hardman, of Birmingham, have just completed a gilt and jewelled monstrance, or altar shrine, for the exposition of the Host, for the Church of the Benedictine College of Ampleforth, in Yorkshire. The monstrance is from the designs of Mr. John Hardman Powell. It consists primarily of a crystal heart, in a metal frame, surmounted by a jewelled and enamelled cross, and supported on an octagonal pedestal, the stem of which is enriched with wrought bosses or roses in sunken panels. The pedestal proper is ornamented with a floriated design in tool work, with a deep topaz-jewelled border, in which the word "Pax" and the Crown of Thorns are conspicuous. On the frame of the heart are enamelled the words of the "Sanctus," divided or punctuated by clusters of carbuncles, and from this centre, as from a crystal sun, radiate burnished metal beams, in straight or waved shafts, enriched in some cases with single carbuncles. The shrine or canopy which surrounds and dominates the centre-piece may be described briefly as a fretted Gothic spire and cross, springing from a trellis-work crown, which is supported by open framework. In the front and sides of the framework are placed angelic figures in attitudes of adoration.

BIRTENSHAW.—On Saturday the foundation-stone of a new Wesleyan chapel was laid at Birtenshaw, Lancashire. The building will be Gothic in style, and will consist of a chapel 57ft. 6in. long, and 35ft. wide, with vestries. The walls will be of brick, with blue brick bands and string-courses and stone dressings. Accommodation will be provided for 346 persons, at a cost of £1,330. The plans have been prepared by Mr. Thomas Ormrod, architect, of Nelson-square, Bolton, and the contractor is Mr. William Townson, of Bolton and Astley Bridge.

HEREFORD.—The quarterly meeting of the Committee of the Hereford Diocesan Church Building Society was held at Hereford on the 1st instant. Grants were made as follows: £25 towards erection of a new mission chapel, at Walford; £50 towards new parsonage, at Ballingham; and £40 towards restoring the parish church of Leintnah Starkes.

MUCH MARCLE.—The parish church of Much Marcle is about to be restored, from plans by Mr. Ewan Christian, at a cost of £2,000. The church has some unusual features. It consists of a large chancel opening through two Early English arches into a north chapel; a nave, with an Early English arcade of four arches on either side communicating with the aisles; a lofty clerestory of single lancets (now blocked up), and a Perpendicular tower built between the nave and the chancel, and quite clear of the aisles. The tower is supported by two large pointed arches, opening into the chancel and nave, and lit, in the lower part, by two tiers of double windows. The chief structural peculiarity of the church arises from its following the slope of the ground towards the east, so that the chancel floor is lower than that of the nave, and the eastern half of each arch of

the nave arcades is longer than the corresponding western half—the piers sinking in regular gradation from west to east.

RAUNDS.—The parish church of Raunds, Northamptonshire has been opened, after restoration by Messrs. Thompson and Ruddle, of Peterborough, from designs by Sir Gilbert Scott. Nave and aisles have been completely restored, the foundations underpinned, and the tower arch opened out. A curious old twenty-four hour clock face was discovered by Sir Gilbert Scott in the tympanum of the tower arch, probably a piece of post-Reformation work of the time of Henry VIII. Several singular frescoes were laid bare in the triforium and on the north aisle wall; one represents the legend of S. Christopher, and another a woman of gigantic proportions, whom Death has pierced with his spear, and from whose body issue ludicrous allegorical representations of the seven deadly sins. The cost of the restoration was about £4,000.

SKIPTON.—A new reredos has just been erected in Skipton parish-church, from a design by Sir Gilbert Scott, in memory of the late Henry Alcock, Esq., of Skipton. It consists of seven panels, the centre one of which contains a beautiful representation of Our Saviour. The outer panels contain the apostles Peter, Paul, Andrew, and John, with two female figures surmounted by an elaborately-carved canopy with tapering pinnacles. On either side of the reredos are geometrically-carved wings, surmounted with an ample cornice. The work has been executed in Caen stone by Messrs. Farmer and Brindley, of London.

WATERFORD.—Mr. J. F. Fuller, the Diocesan Architect, has condemned the spire of Christ Church Cathedral, as being unsafe. The brick-work is crumbling away, and some of the flags with which it is covered are cracked. It is now proposed to rebuild it, at a cost of about £1,200.

WINCHESTER.—A commencement has been made of removing the stone screen dividing the choir of the Cathedral from the nave, in order to enable the builders to get on with the screen designed by Sir Gilbert Scott as a memorial to the late Bishop Wilberforce and Dean Garnier. The two bronze statues of Charles I. and James I., which once occupied niches in the composite screen of Inigo Jones, and were removed into the existing screen when it was built some years back, are now taken from their pedestals, which are being re-erected at the west end.

### BUILDING.

HARROW.—The first stone of the new Speech-room at Harrow School was laid on the 2nd inst. The architect is Mr. W. Burges. It is estimated that this building, exclusive of nearly £4,000 paid for the site, will cost in all £14,000, exclusive of the upper part of the higher tower, the cost of which is estimated at £1,500. The gymnasium, built on a site granted by the governors, from designs by Mr. C. F. Hayward, is now completed and in full working order. Its cost has been about £3,500. The laboratories, built from designs by the same architect, have been in course of construction since December last, and are proceeding rapidly. Their cost will be hardly less than £6,000, exclusive of the cost of site.

### CHIPS.

M. Viollet-le-Duc has resigned his situation of Inspector-General of Diocesan Buildings, owing to a political misunderstanding with the Minister of Public Instruction and Worship.

The contract for the erection of the Barrack buildings for the new Brigade Depot at Budbrook, near Warwick, has been entrusted to Messrs. J. and T. Davis, of Banbury. The amount is stated to be between £40,000 and £50,000.

The new church of S. Mark, on the Gold Tops, Newport, Mon., was consecrated last week. The style is Early Perpendicular. Cost, £6,000; architects, Messrs. Habershon and Pite.

The chancel of the parish-church of Ashbourn is to be restored by Sir Gilbert Scott.

The tender of Mr. John Brown, of Grimsby, for restoring S. James' church, Grimsby, for £1,190, has been accepted.

London bridge is to be repaved with stone, at a cost of £4,600. £9,430 is also to be spent in repairs for Southwark bridge.

Lady Burdett-Coutts has intimated to the Corporation of London her wish to resume possession of Columbia Market. The building is accordingly to be re-transferred to her in the hope that she may be able to carry out her original plans.



## TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

To OUR READERS.—We shall feel obliged to any of our readers who will favour us with brief notes of work contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK STREET, COVENT-GARDEN, W.C.

The queries and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

## ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement is inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 9d. per line.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

## TERMS OF SUBSCRIPTIONS.

(Payable in advance)

Including two half-yearly double numbers. One Pound per annum (post free) to any part of the United Kingdom. To the United States £1 6s. 6d. (or 64s. 4d. gold). To France or Belgium, £1 6s. 6d. (or 32 francs 60 centimes). To India (via Southampton) £1 16s. To any of the Australian Colonies, New Zealand, the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1 6s. 6d.

N.B.—American and Belgian subscribers are requested to remit their subscriptions by International P. O. O., and to advise the publisher of the date and amount of their remittance. If the last-mentioned precaution is omitted, some difficulty is very likely to arise in obtaining the amount. Back numbers can only be sent at the rate of 7d. each, the postage charged being 3d. per copy. All foreign subscriptions unaccompanied by an additional remittance to cover the extra cost of forwarding back numbers are commenced from the next number published after the receipt of the subscription.

Cases for binding the half-yearly volumes, 2s. each.

RECEIVED.—T. L.—P. and Co.—M. J. B.—J. S.—J. J. F. B. W. H. B.—C. A. B.—H. L.—C. G. R.—A. B.—J. P. S.—Rector.

E. J. (Unsuitable, as you really might have supposed).—E. W. T. (You have wasted a postage-stamp. We are not to be taken in so easily).—W. B. (Of course).—RULE OF THUMB (When you are sure you know what you mean yourself, re-write your question in the fewest and simplest words).—G. W. R. (You may ask Mr. Gribble from what point he took the sketch of Temple Church; no having taken it ourselves, we cannot say).—A COUNTRY SUBSCRIBER (You should write your complaint against Mr. E. W. Godwin, and not against us. We gave him due notice that the illustration of Beaulieu would appear, but no response followed).—W. WELLS (out of print).—C. W. (In due time, no doubt). A. W. LLS (The index for last Vol. will be given with next number).—T. T. (You said making your drawing was a labour of love; then it was "love's labour lost" as far as we are concerned, as it is not up to our mark of excellence. You will however, no doubt be able to get it published elsewhere; for we find many drawings which we consider below par appear elsewhere, after we have "respectfully declined" them).

OUR LAST LARGE NUMBER.—As might have been expected, we have received several comments on our last large number. One correspondent, a well-known London architect, says that for some days after working at the large number, he had "BUILDING NEWS on the brain." Another London architect says he had called it in future the "Bulging News." A Country Architect is at the same time pleased and displeased. He is pleased that we are giving so many plates, but he is displeased that he did not know we intended doing so, for if he did, he would not have spent a little fortune in sumptuous books published on the Continent, seeing that we are giving so many illustrations of the best Continental buildings. Mr. F. F. Fox, of Melbourne, in our Derby, says,—"You have given us a great treat in the BUILDING NEWS of last week. I intend to distribute a few copies amongst my friends who do not at present take your valuable paper. Kindly send me by Midland Railway train 16 copies, for which I send Post-office order for 10s. 8d."

## Correspondence.

## S. PAUL'S DECORATIONS.

(To the Editor of the BUILDING NEWS.)

SIR,—Your leader of last week answers any arguments that the most strongly-biased partisan can make for the proposed decoration. Allow me, as an architect, to give some definite reasons why the scheme, as prepared by Mr. Burges, and adopted by the Executive Committee so hastily, and without competitive talent being brought to bear, as you well suggest, is subversive of the objects contemplated. First, it is futile for any individual artist, however versed in the works and examples of mosaic and polychromatic decoration, to lay down a scheme of colour in violation of natural laws and chromatic principles. Aerial perspective teaches us a primary lesson that cannot be too well learnt by the polychromatist. It is, that every bit of bright colour, no matter how beautiful, is reduced to negative or neutral hues directly the great subduer, distance, is brought into play. Remove the variegated flower-beds a

few yards from the eye, and all its separate tints are blended in one great neutral, the very atmosphere itself lending its aerial and softening influence. Again, the parti-coloured carpet of Nature's own landscape is blended into one sombre hue—the misty green or the "blue hill." This lesson should dictate a very different kind of colouring than Mr. Burges proposes. The vaults, domical surfaces, and spandrels should be of negative tints or retiring colours, if indeed the natural light and shadowing of the rich warm stone colour is deemed too cold. But then, Mr. Editor, there are some people who want garish colour and bright contrasts; there are some minds who cannot understand nice distinctions or shades of thought, but who require more pungent odorifics, as the child prefers a bauble, or an ignorant peasant a floriated waistcoat or a gown of many colours.

Second. It is proposed to have "rich colours" in vault and surfaces of apse. Now, rich, dark colouring is absorbent of light as well as detractive of size and distance. Every artist knows, or ought to know—in this theory at least. The lightest possible shades or tints should be employed in these places.

Third. Enrichment or relief must have corresponding plain surfaces, or it becomes bedizenment, but this is what is proposed in "subdividing" and cutting up by plastic mouldings, &c., the plain, flat segmental domes of nave, vault, and clerestory. It is by contrast only that we get enrichment, and those who take the trouble to inspect Owen Jones's works at Kensington will see this and other principles exemplified.

Fourth. Colour should be used sparingly, and only to throw out or give interest to structural lines. The employment of white is not sufficient when bright colours are placed in surfaces as we find here. The use of white is to separate and relieve colour.

Other points of detail may be noticed, but as you have so well discussed these, I will not. If you have space in your valuable journal for these remarks, it will oblige yours, &c.

AN ARCHITECT.

## WALL PAINTINGS IN CHURCHES.

SIR,—There is so much made of every scrap of painting found on the walls of any old English church suffering "restoration," that I am surprised no notice has ever been taken—so far as I know—of the remarkably complete and perfect wall-paintings in a little detached chapel on the south side of S. Brelade's Church, Jersey. The figures are or were, ten years ago, almost perfect, and I should think would be fourteenth century work.—I am, Sir, &c.,

ARTHUR SHEDDRICH.

8, Buckingham-street, Strand, July 2.

## Intercommunication.

## QUESTIONS.

[3387.]—Ventilation.—Is there any work on the warming and ventilation of the Houses of Parliament by Dr. Percy, F.R.S.? If so, I should be glad to be informed as to price and publisher: or if not, of any other good standard work on warming and ventilation.—T. L. P.

[3388.]—Government Contracts.—I shall be much obliged to any of your readers who would kindly suggest how I should act in the following case. I have lately had a contract with the War Department for some builders' work, my tender for which was based on a Bill of Quantities prepared by one of the Government Clerks of Works, whom they appear to have dubbed for the occasion with the title of acting surveyor. These quantities, though not deficient to any serious extent as to the quantity of the work, described the items so differently from those in quantities prepared by professional surveyors that I was led to insert prices against important items much lower than I should have done had I been fully aware of what was implied. The War Department authorities deny their responsibility because the quantity of the work was not deficient. I am informed that before I can sue the Government I must obtain a Bill of Right and go through a lot of other formalities beside, that would entail expenses fearful to contemplate for a poor man like myself. I have no doubt some of your readers have met with cases similar to mine, and if they could suggest a remedy I shall feel obliged. It is too bad of the Government, fenced as they are against legal remedies, to send out documents which are calculated to mislead or entrap the unwary.—S.

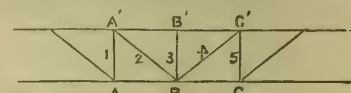
## REPLIES.

[3349.]—Cast and Wrought Iron.—"J. S." asks the difference in strength of girders when

loaded at the top, bottom, and web. From the reply to 3361 he will see that there is a slight difference in the strains on the lattice bars from a load at the top or bottom of the girder, and this is practically the only difference it makes. The load, whether on the top, bottom, or web, compresses the top flange and stretches the bottom in the same ratio. It is chiefly the medium of its transference to these flanges that the different positions of the load affect. In a trussed girder this would be the vertical or diagonal bars; but in solid or plate girders, where the web forms a continuous connection between the two flanges, there is practically no difference in the strength on whichever flange the load is placed. When the load is carried on one side only of the flange, there would be a greater shearing strain on that flange than if both sides had a share in supporting it, besides a bending moment tending to tilt the girder over. "Four tons in compression" means four tons strain on every square inch of the sectional area of any bar, regardless of length. If "J. S." does not yet know this, I am afraid he will have some difficulty in understanding the theory of girder strains from loads placed in different positions. I shall be happy, however, to give him any information that lies in my power on this subject.—R. JNO. G. READ.

[3356.]—Entasis in Spires.—Replying at greater length to "Sigma's" query, as to the reason why the greatest convexity is at one-third the height of spire, he will find that by the catenarian curve I described (the chain being raised so that its upper and lower ends should form the angle of a spire), the greatest curvature will be about one-third from lower end. If "Sigma" draws this curved line, he will find it is far more pleasing than a curve whose convexity is in the centre, though I believe, in many cases, the latter entasis is adopted. Only a short time since I was struck by a spire the entasis of which was excessively bold, if not obtrusive. On a nearer examination I found the swelling, which was considerably more than the rate I allowed in my reply, to be midway. The effect was anything but pleasing. The spire I allude to is that of the church of S. John the Evangelist, East Dulwich. If "Sigma" refers to "Wickes' Towers and Spires of England," he will find an example of very marked entasis (I forget the name) in which a similar kind of curve is adopted. The reason why the eye prefers a swell lower than the middle point, both in a column and a spire, is a metaphysical question, and I think may be referred to a mental law analogous to the physical law which defines the centre of magnitude of a pyramid.—G. II.

[3361.]—Strains.—The strains on the bars of the girder in diagram, are as follows:—



Strains on	Weights 1½ tons at A', B, C.	Weights 1½ tons at A, B, C.
1	+ 2.25 tons.	+ .75
2	- 1.06	- 1.06
3	+ 1.5	0
4	- 1.06	- 1.06
5	+ 2.25	+ .75

R. JNO. G. READ.

[3377.]—Reservoirs.—Since reading "Beta's" answer to "Tank," I found the following formula, which has been used by Mr. Hawksley, C.E.:—

$$d = \frac{1}{15} \sqrt[5]{\frac{q^2 l}{h}} \text{ in which}$$

$q$  = gallons per hour.

$l$  = length of pipe in yards.

$h$  = head in feet.

$d$  = diameter of pipe in inches.

VI ET VIRTUTE.

[3381.]—Thickness of Water-pipes. c I am obliged to "T. R." for his correction, but his ensure for not copying correctly does not apply to me; the divisor in my "Box's Hydraulics" (second edition, date 1870), is 2,500. This is evidently a printer's error which escaped notice in the revision; it should be 25,000, as stated by "T. R."—BETA.

[3384.]—Shrinkage of Flooring.—One of the prime causes of wide gaping joints appearing in floors after being laid some time is using broad boards. From the fact of 7in. being the narrowest battens imported until the last few years, this width has become the customary standard or fashion, and so strong is custom that it is now rarely departed from. This is one of the popular errors connected with the building trade, and the custom of using broad flooring boards cannot be too strongly condemned. Five inches or even four inches will make a far better floor, and on the whole be more economical in cost. It requires no argument to show that if an eight-inch floor-board shrinks one-quarter of an inch, a four-inch board shrinks only half; hence the open joints in floors laid with narrow boards are matters of very little moment, whereas in wide boards it is a crying evil. Your correspondent "L." has broached a subject of great importance, one not easily dealt with in the space allotted to "Intercommunication," hence I take it the mere headings



can only be touched upon. Flooring dried in the open air in this our English climate will afterwards shrink in the dry atmosphere of dwelling-houses or other buildings, and open joints cannot be avoided except by using stove-dried boards laid down as flooring after the building has become thoroughly dry and seasoned. This is, strictly speaking, an impossibility, and it is the wisest course to face the evil in the most practical manner. As to the mode of manufacture, tongued and grooved are, undoubtedly, the best, and now they can be so cheaply prepared by machinery it is strange that square-jointed flooring should still be so general in certain districts. There is also a great degree of uncertainty or indecision respecting white or yellow (red) flooring—some firmly adhere to the latter from the general impression that it is the most durable. This is very questionable. As a rule, white boards are the soundest and cleanest, and under general wear present the best appearance; certainly the sapwood will not turn black under the repeated process of washing, nor will the heart-wood assume the general dirty appearance common to red wood. On the point of durability, white wood, if kept dry, will answer all purposes; indeed, it is very questionable whether the beautiful wood of this description, shipped from Russia, should not be generally used for flooring and internal wrought work. Spruce (Canadian)—as white wood for flooring—has the evil of peg-knots, which become loose and fall out after the floors have been some time out of use. For general purposes nails are the only medium of fastening, and it is scarcely practicable to tear up floors after the shrinking is over, and relay, without great danger to the ceiling underneath. The system of double thickened floors, as used in Lancashire, might be more generally adopted. It is the most general in the mills, a rough floor (joists shot) say of 1½ in. boards, is first laid, and a floor of ¾ in. finished boards upon the top. The object in this case is to effect a speedy repair when the floors have become worn. In stead of taking up the whole floor, the top thickness only is replaced from time to time as required. For general purposes, a rough floor should be laid, say, three boards out of 2½ narrow battens, with an extra saw run down to thickness the outside board; this floor could be grooved or square-jointed at discretion, the hearths, door-steps, stairs, &c., could be fixed to the finished height to admit of ¾ in. floors being laid on the top after the building had become thoroughly seasoned. This finished thickness could be fixed with strong sprigs or joiners' brads without damage to the ceilings below, and if dry when laid down would ever after remain a perfect floor. Another difficulty quite as bad as a shrunken floor, would be overcome, viz., that of the plinth which would be perfect in its fit to the new thickness of floor. In speaking of popular errors in connection with the building trade, we have an amusing illustration in the nails or brads used for laying floors—¾ in. are held to be the requisite length for 1½ in. floors, and 2½ in. for 1 in. floors; the former is the most absurd; but we will examine the question of the latter, 1 in. board are only 7-8 in., when finished, and these 2½ nails are punched ¾ in. below the face of the boards, thus leaving ¾ in. out, and 2 in. in the joist. There is no real necessity for these strong nails going in above half this distance. The general effect is to split the edge of the small and thin flooring joists in all directions, and, in the end, falling in the object it is intended to achieve. Flooring has no soaring ambition requiring a mass of iron to counteract: it wants simply holding in its place, and if well prepared requires very little force to effect. Why the joist should have nails driven in it at intervals of every 4 or 5 in. from one end to the other, at the expense of sacrificing them as bearing timbers, is hard to explain. Narrow boards with one nail to the crossing of each joist, fixed in the centre or alternate edges of the board, would answer every purpose; on this question of nails a saving of nearly 50 per cent. might be safely effected—no small consideration in these costly days of building. I have noticed a very excellent plan in Sweden; but, although commonly adopted in connection with the shrinking of wall-boarding and wooden ceilings, is scarcely applicable to flooring. Small pieces of wood, the same shape as our iron washers, are fixed under the heads of the nails (wrought clouts). When the boards have been in work about two years, these bits of wood are split off, and taken from under the nail heads. The nails then project sufficient from the wood to be drawn out with pincers. The boards are thus placed close up in their joints, and permanently nailed. In Norway they have admirable floors. It is the custom to paint them drab or cane colour, and lay a carpet in the centre, or on the points most liable to be worn. When sprinkled over with aromatic sprigs of green fir—the general custom—they have an admirable effect. In a sanitary sense, we should do well to adopt this system. They never retain the wet when washed in the winter time, and they render carpets—that fruitful source of a dusty atmosphere—wholly unnecessary; and last, not least, they effectually dispose of the question of shrinkage and bad joints.—W. STEVENSON, Hull.

[3385].—Discoloured Yellow Pine.—The spotting or staining of the pine sheeting alluded to by "D. M. J." is owing to the boards being laid too close upon one another during the warm season of the year. Experience proves that in the storing of wood little care need be taken in the winter season when nature is at rest; but as spring comes round and vegetation—in the words of Thomas Hood—puts on "its furniture of green," the greatest care is needed. Wood which, although dead to all appearance, is still alive to

vegetation in its lowest form in warmth and moisture, will cause a fallen tree to sprout sprigs of leaves from its bark, and, falling thus, fungi will most certainly germinate. Wood denuded of its bark takes the latter form, hence discolouration of sapwood spotting, staining, and dry-rot; in these cases it is literally forming food for other forms of vegetation, and, if not arrested by intercourse with dry air, will sap its veriest vitals and "leave but a wreck behind." In the case in point, the spread of the fungi would cease upon the boards being removed from contact with each other; but the damage wrought is not easily effaced. If the roots have not struck too deep into the wood, the discolouration may be removed by refacing the boards, but, if otherwise, it may safely be taken there is no possible remedy.—W. STEVENSON, Hull.

[3386].—Liability of Architects.—NEMO.—You are unquestionably liable for negligence and want of care in your survey as detailed by you, and for your solicitor to say "No" is nothing new; but I would advise you to make your peace with the parson and committee as early and as best you can. Many cases can be cited in support of my position, and on referring to your own list of the causes in equity, &c., you may refresh your own memory. Much interest in our architectural works would be created, and a benefit conferred, if the editors would direct more attention to the liability of architects by providing a well-digested summary, as in the *Law Journal*, &c., but in this case of architectural causes only.—M. G.

[3386].—Liability of Architects.—No conclusive answer can be given to "Nemo's" question. I assume that there is no written contract between himself and the committee exactly defining his duties as architect, in which case he is bound to them in common law to bring to the exercise of the work for which he is paid, or expects to be paid, ordinary and due care and skill, vigilance, and diligence. Whether he has done this in the particular instance in question may be fair matter for difference of opinion between himself and his clients; and if they cannot agree, it is one of the questions which a jury would have to decide; being a question of fact, the judge would direct the jury to the effect of their finding of the fact upon the verdict. "The Professional Practice and Charges of Architects," as settled by the Royal Institute of British Architects, states that included in the ordinary charge of 5 per cent. is the "general superintendence of works (exclusive of clerk of work-)." I should say that that phrase does not convey that the architect is to warrant by his certificate that every minute portion of the building is exactly according to the contract entered into between the builder and the owner, nor that every scantling, dimension, and weight is precisely as specified. Would it not be desirable, in dealing with many clients, to submit the above-mentioned paper of the Institute to them, and upon taking up the work to have duplicate copies signed by architect and client, with an endorsement shortly stating that the engagement of the architect was in accordance with the terms thereof, and that the architect agreed thereto?—L.

[3386].—Liability of Architects.—I am of opinion that "Nemo" is not responsible for the defective leadwork on the restored church, and that for very many reasons, amongst which the employment of a clerk of works by the committee and churchwardens to superintend the execution of the works would, I think, necessarily make either them or him responsible for his neglect; in not seeing that at the time the lead was put down it was of the proper weight per foot specified, else what use was the clerk of works, and to whom was he useful but his employers (the committee and churchwardens)? I believe it is customary for the architect himself to place his own clerk of works on the spot, but in this case the committee and churchwardens seem to have selected one who has not done (or probably does not understand) his duty.—ROBEY CARPENTER, Quantity Surveyor, Forbury, Reading.

#### STAINED GLASS.

ARBROATH.—A stained-glass window has just been placed in St. Vigean's Church, Arbroath. The subject is taken from the martyrdom of St. Stephen. The window has been supplied by Field and Allan, of L.ith.

LEEDS.—Mr. W. J. Boor, glass stainer, has just completed a large stained window containing six historical subjects, viz., "The Revolt of Bodicea," "The Death of Harold at the Battle of Hastings," "The Embarking of Richard for the Crusade," "The Swearing of the Barons to obtain the Magna Charta," "The Signing of the Magna Charta," and "The Trial of Archbishop Scrope." The tracery contains the shields of the Hanoverian, Tudor, Scotland, Ireland, York, and Leeds coats of arms. The whole window is composed of antique glass, after the Early English treatment.

#### WATER SUPPLY AND SANITARY MATTERS.

CARMARTHEN.—An inquiry was held at the Town-hall on Wednesday week by Major Tulloch, R.E., an Inspector of the Local Government Board, with respect to a scheme for completing the sewerage of the town, which has been prepared by Mr. R. J. George, C.E. The Corporation propose incurring an expenditure of £5,000 on new sewers, with adequate flushing and ventilating arrangements, both for the new works, and also in the

existing town sewers. It was understood that the Inspector would report in favour of the scheme.

IPSWICH.—A Committee of the Ipswich Town Council have reported in favour of purchasing the Ipswich Water Works for £100,000, and thirty years' purchase of the net revenue, which, it is stated, is now £5,000 a year. The Committee make this recommendation subject to the Public Works Loan Commissioners agreeing to lend them the money for the purchase at 3½ per cent., the amount to be repaid in 50 years.

LEEDS.—At the last meeting of the Waterworks Committee of the Town Council, it was decided to proceed with the construction of the Fawcett reservoir, which forms part of the Washburn Foot scheme. This is the third reservoir on the river, its site being about 500 ft. above sea level, and its capacity when finished 870,000,000 gallons.

ROTHERHAM.—At present the water supply of Rotherham is limited to two hours per day, but an attempt is being made to procure a supply from Sheffield, in addition to further local works.

THE WATER SUPPLY.—A circular has been issued by the Local Government Board to the sanitary authorities throughout the country, pointing out that there is reason for apprehension that as the summer advances the evils arising from the long continuance of dry weather will be extensively and seriously felt. The board therefore urge the sanitary authorities to inform themselves fully of the nature and extent of the existing water supply in their districts, and impress upon them the expediency of adopting every available precaution for the storage of wholesome water in those localities which are likely to suffer from drought.

#### LAND AND BUILDING SOCIETIES.

WAREHOUSEMEN AND CLERKS' PERMANENT BUILDING AND INVESTMENT SOCIETY.—The fifth annual meeting of this society was held on Friday. The report and accounts showed that to the 30th April last 2,234 investment, and 1,792 advance, shares had been issued, and 954 withdrawn or redeemed, thus leaving 3,072 in operation. To the same date £44,790 had been advanced. The directors had again resolved to declare a bonus of one per cent., making a total of six per cent. for the year.

#### LEGAL INTELLIGENCE.

CASE UNDER THE METROPOLITAN BUILDING ACT.—THE DISTRICT SURVEYOR OF HAMMERSMITH v. VAN SONDEN.—The defendant, who had erected at 258, Goldhawk-road a wooden fowls-house of small dimensions, and attached it to a party fence-wall, was summoned before Mr. Ingham, at the Hammersmith Police Court, for not giving notice in writing. His contention was that it was not a building. Mr. Knightley, the District Surveyor, contended that it was a building within the meaning of the Act, and in support of that view read over the exempted buildings, amongst which such structures as the one in question find no place. He also read Sec. 69, which relates to dangerous structures, observing that if the structure in question was in a ruinous state it would then be recognised as a "structure" or "building," and urged that if in a dilapidated state the law took cognisance of it, that circumstance, together with the fact that it was not specially exempted, was sufficient to justify the enforcement of the rules of the Building Act. In this view the magistrate concurred, and decided in favour of Mr. Knightley.

THE EXETER REREDOS CASE.—In the Court of Arches on Friday, the Exeter reredos case, "Boyd and others v. Phillpotts," was before the Dean of Arches, and he decided the question as to the jurisdiction of the Court to hear an appeal from an order of the Bishop of Exeter as to the removal of the reredos from the Cathedral Church. A question, it seems, would arise whether the bishop, on his visitation, could order a removal of the reredos, and another question was whether the appeal was from the decision of the bishop to the Court of Arches.—Mr. Phillpotts, for the Bishop of Exeter, on the appearance under protest, contended that the appeal should have been made to the Archbishop of Canterbury in person, and not to his official principal, who was not his vicar general.—The Dean of Arches, in giving judgment, referred to the several matters in dispute. He decided that he had jurisdiction to hear the appeal; and unless the question was taken before the Judicial Committee, on appeal from his decision, he would shortly hear the case.

The foundation-stone of a new Primitive Methodist chapel was laid at Ipswich on Thursday week. The building is to be a plain Gothic structure of red brick, with white facings. The dimensions of the chapel are 60 ft. by 35 ft., and it will afford accommodation for 400, and the school and classrooms 225 persons. The contract has been taken by Mr. Robert Girling at £1,274. Messrs. Catermole and Eade are the architects.

The lion who has extended his hollow copper tail over the summit of Northumberland House for a century and a quarter was removed on Friday last. He is in future to ornament the grounds of Sion House.



## Our Office Table.

**ALTAR CHALICE FOR S. PETER'S CHAPEL, KILBURN.**—Messrs. Lias and Son have shown us a new chalice manufactured for the community of S. Peter's, Kilburn, as a memorial of the late Mrs. Lancaster, the foundress. It is a richly-gilt silver chalice, eight and a-half inches high, the foot and stem hexagon shape, the outer rim being a circle. In the divisions of the outer circle there are six separate mountings of jewels. In three, five opals encircle an emerald centre. These are set round with four pearls. In two a carbuncle is surrounded with eight pearls. In the other an amethyst is encircled with eight pearls. In one division of the foot there is a jewelled cross set with upwards of thirty diamonds, having an emerald for the centre. Opposite the cross the keys of S. Peter are embossed on a rich ground, and on the other four divisions of the foot the symbols of the Passion are chased in high relief. On the points and centres of circles there are twelve turquoises. One hundred and eight pearls and garnets are set alternately round the half-circles and up the stem. In the boss the six principal lozenges have settings of rubies, diamonds, garnets, opals, pearls, and turquoises. The outer cup or bowl has the lower portion embossed with vine-leaves; garnets representing grapes are placed between them.

**EGYPTIAN BLUE.**—A remarkable and very beautiful shade of blue is noticeable upon many of the ancient ornaments found in the tombs of Egypt. Analyses some time since are said to have proved the colour to be formed by a combination of soda, sand, and lime, with certain proportions of copper, from which substance the Egyptians managed to produce three different products: first, a peculiar kind of red, green, and blue glass; second, a brilliant enamel; and lastly, the colour to which reference is made above, and which was used for painting. By synthetical experiments, M. Peligot is stated to have succeeded in reproducing this peculiar shade of blue by heating together 73 parts of silica with 16 of oxide of copper, 8 of lime, and 3 of soda. The temperature should not exceed 800 deg. Fahr., as, in such cases, a valueless black product is the result.

**A CHEAP AND DURABLE GREEN PAINT.**—The *Journal of Horticulture* recommends the following as a cheap and durable green paint:—Half-a-pound of black paint with half-a-pound of yellow ochre (Oxford ochre, by preference) ground into it, and well stirred together. These will make a paint of an olive-green, varying in colour according to the quality of the yellow ochre; but a little more, either of the black or the yellow, may be added to produce either a deep ivy-green or a lighter shade, up to the palest aucuba-leaf. When the colour required is arrived at, a pennyworth of patent driers is to be added. This paint may be kept for a considerable time in a cool place, and with two or three inches of water over it. When required for using, take a small portion out into a pipkin and thin with equal parts of raw linseed-oil and turpentine. On no account should boiled oil be used, as this causes the paint to dry on the surface while it remains soft within, and renders it very liable to blister when exposed to the sun. One coat of this paint will be found to cover very fairly, but it is always best to lay on the first coat very thinly, and let it become thoroughly dry and hard before completing with a second coat.

**DURHAM CATHEDRAL.**—A pastoral staff has come to light in the tomb of Bishop Flambard. The woodwork is quite gone, but the length of the staff was clearly shown in the coffin. The top or crook, although much oxidised by the interment of more than eight centuries, is very perfect. It has been sent to the British Museum for the present. Several stones of the old Chapter-house have come to light.

**THE COST OF THE SOUTH KENSINGTON MUSEUM.**—It appears from a Parliamentary return obtained by Mr. Dixon that the total cost to the nation of the South Kensington Museum, from its commencement to the end of the financial year 1873-74, was £1,191,701. 19s. 4d. The cost of purchases made for the Museum has been £281,672. 9s. 1d., of which sum £30,220. 18s. 1d. has been for reproductions, plaster casts, &c.; £38,642. 6s. 11d. for the art library; and £18,009. 2s. 11d. for the educational and scientific collections; the remainder—£194,799. 18s. 2d.—has been expended in the purchase of sculpture, wood and metal work, jewellery and goldsmiths' work, earthenware and stoneware, &c.

## CHIPS.

The works of the S. Gothard tunnel are advancing regularly at the Goexhenen end at the rate of 10ft. per day, but considerable obstacles have been encountered at the Airolo end. Landslips have damaged the water-conduits and approaches, and in the tunnel itself exceptionally hard rock makes a rapid advance impossible.

A new lighthouse is being erected on Ferguson's Point, opposite Kingston, on Wolfe Island, Canada.

On Monday a landslip occurred whilst some workmen were digging the foundation for a new church, to be built for the Rev. A. D. Wagner, at Brighton. Two of the men were buried, one of them being killed on the spot, and the other much injured.

We are requested to state that the paragraph in our last issue (p. 46) referring to the Hanley Borough surveyorship, was inaccurate in one respect. The Town Council resolved to increase the salary of the surveyor from £230 to £300. An amendment was proposed to make it £265 this year and £300 afterwards, but this was not seconded.

Under head "Statues, Memorials," we last week described the Clement Memorial fountain as having been erected at Leamington; we should have said Shrewsbury.

Last week the Town Council of Southampton, by a vote of 21 to 3, decided to use Cypriot street-lamps in several more streets. They have been used in the entire length of High-street for nearly two years.

A new Mission Church, dedicated to S. Peter, was opened at Brixham, on the Feast of its patron Saint. Cost £900. Architect, Mr. Cole Adams, of London.

The foundation-stone of the new church of S. Agnes, Kennington, was laid on Wednesday. The church, which is unusually large, being 146ft. in length and 65ft. in width, will seat a congregation of upwards of 1,000. The style is Decorated Gothic, and the estimated cost £10,000. Mr. Gilbert G. Scott, jun., is the architect.

New Board schools have just been opened at Tynemouth, North Shields, for 870 children, and at Chilton for 245. A novel expedient has been adopted for heating the meals of children who come from a distance. The desks are arranged in what is known as the "double Battersea" method.

**CHUBB'S STRONG ROOMS,**  
Iron Doors and Safes;  
IRON LININGS, SHELVING, AND OTHER FITTINGS  
OF THE BEST MANUFACTURE.  
CHUBB'S PATENT LOCKS,  
CHUBB and SON,  
Makers to the Bank of England,  
57, S. Paul's Church-yard, E.C.  
And 68, S. James' street, S.W.—[ADVT.] } London.

## Trade News.

### WAGES MOVEMENT.

**SOUTHPORT.**—The bricklayers' labourers of Southport have now been off work three weeks. They struck for an increase of wages to 28s., this being an advance of 2s. The employers are now devising means to do without so much manual labour, and, as a first step, machines for hoisting material are about to be introduced into Southport.

## The Timber Trade.

Wholesale prices of Timber, Deals, Mahogany, &c.:—  
Per 50 cubic feet.

	s. d.	s. d.
Quebec oak	160 0	180 0
" Rock elm	150 0	180 0
Ash	140 0	160 0
Quebec large birch	110 0	160 0
New Brunswick and Prince Edward's Isle do.	85 0	110 0
Small averages do.	70 0	80 0
Red pine masts	90 0	120 0
Large yellow pine do.	80 0	130 0
Oregon do.	180 0	240 0
Kaurie do.	160 0	220 0
Norway spars	40 0	60 0
Indian teake	240 0	290 0
British Guiana Greenheart	180 0	200 0
Australian Ironbark	170 0	220 0
Memel crown oak	110 0	260 0
Do. brack do.	105 0	
Dantzic and Stettin crown do.	110 0	160 0
Do. do. brack and unsquared do.	100 0	120 0
American red pine, for yards and spars	90 0	130 0
Do., mixed and building	70 0	80 0
Do. large yellow pine	110 0	130 0
Do. waney board do.	110 0	130 0
Do. small do.	80 0	90 0

	s. d.	s. d.
Pitch pine	75 0	85 0
Do. for masts and spars	95 0	125 0
Swedish fir	60 0	65 0
" small	50 0	58 0
" and Norway balks	40 0	55 0
Riga fir	80 0	85 0
Baltic crown	90 0	110 0
" best middling	80 0	100 0
" good do. and second	75 0	90 0
" common middling	70 0	80 0
" undersized	55 0	65 0
" small, short and irregular	50 0	60 0
Per 18ft. cube.		
Riga crown wainscot logs (English and Dutch)	120 0	135 0
Memel crown	95 0	110 0
Riga brack	95 0	100 0
Memel brack	75 0	85 0
Per mille, plpe.		
Memel crown oak staves	270 0	300 0
" brack	250 0	280 0
Dantzic, Stettin, and Hambro'	220 0	240 0
Canadian standard pipe	80 0	85 0
" Pancheon per 1200 ps.	20 0	22 0
Bosnia, single barrel per do.	28 0	
United States pipe	50 0	75 0
" Hhd. heavy & ex.	30 0	45 0
" " slight	20 0	21 0
Per cubic fathom.		
Lathwood, Petersburg	10 0	11 0
" Riga, Dantzic, Memel and Swedish	8 0	9 0
Firewood, Swedish deal ends	6 0	6 10
" Norway red & white boards	4 10	6 0
" round and slabs	3 10	4 0
Per foot run.		
Norway poles	s. d. 0 2	s. d. 0 3
Each.		
Norway rickers	0 10	1 2
Fresh luncewood spars	7 0	9 0
Ordinary to fair do.	5 0	6 0
Per superficial foot.		
Honduras mahog. (cargo avge.)	0 4½	0 5½
Mexican	0 4½	0 5½
Tobacco	0 6	0 6½
Cuba	0 7	0 10
S. Domingo	0 7	0 10
" curls	1 0	2 0
Cuba cedar	0 4½	0 5½
Honduras and Mexican cedar	0 4	0 5
Australian	0 3½	0 4½
Pencil	0 2	0 3½
Italian walnut	0 4½	0 5
Black Sea	0 3½	0 4½
Canadian	0 3	0 4
Bird's-eye maple	0 5	0 7
S. Domingo satinwood	1 0	1 6
Per Ton.		
Bahama satinwood	7 0	9 0
East India (nominal)	8 0	10 0
Rio Rosewood	14 0	20 0
Bahia	12 0	18 0
Puerta Cabello zebrawood	7 0	8 0
Ceylon ebony	10 0	18 0
African billet do.	12 0	15 0
S. Domingo Lignum vitæ	6 0	10 0
Cuba coccoswood	5 0	7 0
Turkey boxwood	5 0	16 0
Per 120 12ft. 1½ by 11.		
Quebec 1st bright pine	21 0	26 0
" 1st floated	20 0	23 0
" 2nd bright	15 0	17 0
" 2nd floated	15 0	15 10
" 3rd bright	12 10	13 10
" 3rd floated	12 10	13 0
" 1st spruce	13 0	13 10
" 2nd "	10 10	11 10
" 3rd "	10 10	10 15
S. John's	10 0	11 0
" spruce battens	9 10	10 10
Nova Scotia, &c., spruce	10 0	
Archangel yellow	16 10	17 10
" 2nd do.	14 10	15 0
Petersburg 1st yellow	13 10	15 10
" 1st white	3 by 9 14 0	
" 2nd "	3 by 11 12 10	
Wyburg 1st yellow	13 10	14 10
Gefle 1st & 2nd yellow	3 by 9 16 5	
" "	2 by 9 16 10	17 0
" "	2½ by 7 15 0	
" "	2½ by 9 15 15	
" 3rd "	3 by 9 15 0	15 10
" "	2½ by 9 15 0	
" "	2½ by 7 14 5	14 10
Soderham 1 & 2 yellow	3 by 10 14 0	
Swartwick	3 by 9 15 0	
" "	3 by 7 15 5	
" 3rd "	4 by 9 15 0	
" "	2 by 9 15 5	
Memel 2nd "	4 by 9 14 10	
" 2nd "	3 by 9 13 10	
S. roka 1st "	3 by 11 16 5	16 10
Hudikswall 2nd "	3 by 11 13 5	
Flooring per customary square.		
Best yellow	s. d. 14 6	s. d. 17 6
" white	13 6	14 6
Second qualities	12 6	15 0
Do. grooved, tongued, and beaded, per sq. ½ and ¾ inch	9 0	12 0



## THE BUILDING NEWS.

LONDON, FRIDAY, JULY 17, 1874.

## IRON IN ART.

THE visit of the Architectural Conference to Mr. Kirkaldy's works may have elicited some useful facts as regards iron, and, at any rate, the visit may be fraught with some good result, especially if architects will only eradicate that bias against it as an architectural material. The couplet—

"Oh! what perils do environ  
Him who meddles with cold iron,"

perhaps has made architects a little timid of the use of iron in construction; but we venture to say, if this be so, it is only lack of knowledge on their part. Let us take cast iron. The mysteries of the pattern-shop are too much unknown to architects at present for them to commence a new era in casting, and therefore it is the matter is entirely under the control of the pattern-maker or iron-founder. The moulding of iron implies a knowledge of the pattern-shop, without which it is a hopeless task to design any special or complicated casting, and the founder has the prerogative of dictating to the architect the kind of design best fitted for moulding, and the separation into easy pieces of the mould itself. Now, as long as this kind of technical inability or ignorance lasts the architect is compelled, in certain cases, to accept the ordinary patterns of the workshop, and thus few improvements in castings are ever seen. In designing cast-iron work it is essential to pay regard to certain rules. The idea must be kept in view that the design has to be cast in a hollow mould, the parts of which must admit of easy separation, in order to get the pattern out and allow the molten metal to be poured in. These separate pieces or moulds should be as few as possible, and in such places as will least impair the efficiency of the casting. It is therefore necessary for the young architect to consider how the pattern of his design will draw out of the sand before he sends the design to the foundry. By this foresight he will often save a considerable sum on castings, and at least half the labour of moulding. It has been suggested by a writer upon this subject, that if, instead of drawing an article as usually done, a drawing be made showing the solid cores and hollow mould, and the core prints marked on it, it would considerably lessen the cost of the work, as such drawing is obliged to be made by the ironfounder, who charges it to the job.

Equally important is the manner in which the design of mould should facilitate the flow of the liquid iron. Inequalities of thickness or sudden angularities or changes of form should be carefully avoided in designing cast work, or unequal cooling and air-bubbles cause defects in the iron which no after-thought can remedy. In casting iron columns, where the resistance of the material has to be pretty uniform throughout and on all sides, it is essential that the molten iron should evenly and simultaneously fill the mould. To produce this effect it is best to run the iron into moulds set vertically, and not placed horizontally, as is sometimes the case. This allows an equal density of metal to form in horizontal strata and throughout the section of the column, instead of, as when cast horizontally, to cause the densest part to settle on one side of the column, and often to cause, in a hollow casting, the upper part of the rim, or one side of the column, to be much thinner than the opposite side. We need hardly say such an unequal casting would tend to create an unequal resistance in the column when placed under its load, and, by throwing the weight on

one side, thereby cause, perhaps, a failure. It must be borne in mind that every column has certain duties to perform—1st, to support the load so that the resultant of the resistances shall coincide with the geometrical axis of the column, or, in other words, so that the pressure shall not be one of varying intensity on the opposite sides; 2nd, it has also to resist flexure or bending. These duties require that the pillar should both resist compression and tension, or that about one-half of the strength of the pillar should resist crushing, the other half resist flexure. The exact limits of the two opposite forces are not exactly defined. Above five and up to eight diameters a pillar is found to yield by bulging. Mr. Kirkaldy's museum shows the kind of fracture to be of wedge shape, these wedges forcing out others at the side; under five diameters it resists simple crushing; above eight, a conjoint action of the two resistances takes place, till, when it reaches, say, 60 diameters, it fails by simple bending. The ordinary proportions of iron pillars, however, rarely exceed in length 20 to 25 diameters; and therefore it is necessary to take into consideration only any unequal or external strain that may be brought to bear upon it. We think great additional strength may be given to pillars of those proportions by casting them with projecting fillets or flanges, these being placed either to give an ornamental section to the shaft externally or be cast inside the hollow; such longitudinal ribs, if we may so call them, would considerably aid in resisting tension and flexure. For example, sections of different forms present themselves; a quatrefoil with fillets at the angles, hollow-sided square, ribbed cylinder, fluted sections, simple cross sections, &c. Even an octagonal or polygonal shape, the bore being circular, thus giving at the angles greater thickness of metal, would be stronger and more economical than the common cylindrical shape. Every pillar may be looked at as a lever, the diameter being one end, the half length of pillar the other end, and thus it really is analogous to a girder. Under these circumstances, it is easily perceived what effect a very projecting cap or base flange would have. In case of a settlement in the foundation, or a deflection of the girder, or an unequal weight brought to bear on one side of the cap or base, the effect would be to make the projecting cap or base a leverage in creating a flexure of pillar. It is then necessary not to project either cap or base beyond the shaft to any great extent; but this should be determined by considering whether any uneven pressure would be brought to bear upon the cap; as, for example, when the pillar is not central between supports, or when a girder or two girders rest upon it in such a manner as to make the bearings unequal. It is evident in this case the side of pillar nearest the widest opening would have to bear the most weight, and consequently would tend to press on that side of shaft, and cause the pillar to deflect. It is strange, however, architects and others so seldom think of these little matters, and merely provide the ordinary kind of pillar to bear a certain assumed load. It is laid down in works that the working load on pillars should not exceed one-sixth of their breaking weight; one-tenth perhaps in some cases would not allow too great a margin of safety.

Another precaution in reference to iron pillars is necessary to be attended to. When such a pillar or stanchion is placed close to a brick pier or wall, it must not be thought that both take the actual weight or bearing, unless, indeed, the pillar is tied to a hard brick-and-cement built pier. In general, a brick pier compresses or settles even when formed in cement, to a degree at least that gives to the iron the entire support, and therefore the pillar should be of sufficient size to support without help, and be further placed on a sufficient pier or base. We hope the Metropolitan Management Act, which is under

revision, will take cognisance of the supporting piers no less than the iron pillars. We have frequently seen an ordinary mortar-built wall or basement taking the bearings of iron supports, with a mass of building resting upon them four or five stories high.

Bases should be true and level, and the base flanges should rest on some yielding substance, as sheet lead, though some recommend an unyielding packing of iron and cement grouting, the latter one to one.

In another article we will make some other remarks upon this very important subject.

## SCHOOL ARCHITECTURE AND PLANNING.\*

[SECOND NOTICE.]

HAVING discussed the theory and general plan of Elementary Schools, the sizes, division of departments, aspect, lighting, and school-desks, we can now take up the practical details of the subject. The points we have referred to really become the elements of school-planning, and their due consideration and definition, or, we would say, the architect's mastery of them, is more essential to the development of a good school plan than the mere collection and study of examples, though we much fear the latter method of arriving at the solution of the problem is the one most generally resorted to.

The age at which infant-teaching should begin has ever been a perplexing question with educationists. As Mr. Robson says, the infant department of a group of English Elementary Schools has no counterpart in other countries. Infants under six years are not recognised in Germany, though institutions on the Kinder-garten principle are organised for their amusement and occupation before that age is reached; but although under the eye of Government, form no part of the school system. America, too, provides similar schools, called "Alphabet" schools; and in France there are the "Halls of Asylum," or a species of day-nursery (*crèche*); but none of these are recognised as parts of the educational establishments. Rationally, a system of mental training for an infant before the age of six is of very doubtful benefit; the physical powers can hardly have been sufficiently developed, and even for some time after that age, we think, with Mr. Herbert Spencer, that bodily training should be primarily regarded. Under our Education Act, children are not compelled to attend school before the age of five years, though among the labouring classes infants are drafted into school to be out of their mothers' way. Mr. Robson remarks: "It is open to question whether infant-schools should not be more numerous than graded schools, so that children of the smallest size may not have long distances to walk from their homes. If two were built a little distance apart, and on different sides of the latter, the elder children from opposite parts of a district, could with greater convenience bring the younger." This suggestion is, at least, worth consideration.

In planning an infant-school, the proportion to be allowed for those under five years must be considered. Mr. Robson puts this at one-fourth the total number; and the minimum number to be taken for size of school may be taken as 120. A separate room for "babies" is necessary, and this should be divided from the main infants' school by a solid wall, to prevent passage of noise. It should also be provided with direct access to playground, &c., so as not to interfere with the work of other school-room. An infants' school may then consist of a schoolroom and one classroom. The partition wall between these rooms should have a small window or

\* "School Architecture: being Practical Remarks on the Planning, Designing, Building and Furnishing of Schoolhouses." By EDWARD ROBERT ROBSON, F.R.I.B.A. London: John Murray. 1874.



pane of glass, to enable the mistress to watch the movements of the youngest children. For a larger number, as 170, another classroom is desirable, and this can be set apart for senior infants, say from 20 to 30 in number. In still larger schools, two classrooms with sliding partitions, and having two separate entrances, may be needful. Generally, 250 is the maximum number which a mistress can manage, and no larger school than that is desirable, though our author shows one for 300 children. The school-room in this case has at one end the senior department, divided by a sliding partition into two classrooms of 30 each; and at the other end the babies' room, with galleries for 66. The centre schoolroom has also galleries divided by a sliding partition into two groups, with top-light. Duplicate entrances, cloak-room, and lavatory are provided between the junction of the schoolroom and end classrooms. The schoolroom has provision for 174, or 72 in each gallery and 30 at desks, these being placed along one side of the room, end to end. The galleries are recessed, the walls being extended for them.

Position is an important point. If the limits of area present an isolated and separate block for the infants' school, or if two schools must be placed one over the other, the access to the top school should be by an inclined plane, or easy staircase, or a combined use of both, and the babies' department should be on the ground floor. The disposition of the plan of an infants' school, as may be inferred from our remarks, would be more or less of a long parallelogram, the classrooms being placed endwise or across, as most convenient, and the galleries and porches forming the only projections. As to the superficial area of school and classrooms together, it should not be less than eight feet per infant; under this, no grant on results will be paid, and the school is condemned as over-crowded.

Let us now turn to fittings; and first to galleries. Two galleries, the largest of which should never provide for more than 72 children, must be arranged, a space of 14 inches being allowed to each child. Gangways to be provided at each side, not in the centre, as interrupting the teachers vision. We are given (pp. 186, 187), a design for infants' gallery, six rows deep, the seats graduated in height from  $7\frac{1}{2}$  to  $9\frac{1}{2}$  inches, to suit the children. Backs 8 inches high, sloped, and secured by flush angle irons screwed to floor, are provided 9 inches from edges of seats. From back to back a distance of 1ft. 11in. is allowed. The rise of each seat is divided by two risers at gangway steps, the gangways being 18in. wide. Panelled framing, or simple match-boarding grooved into a rounded top-rail, finishes the gallery against the wall. This gallery is, we understand, universally used in the Board Schools of London. Instead of six rows deep a depth of five rows may be used, and for the babies' gallery four rows deep will be sufficient. The smaller infant's gallery may be constructed to run on wheels, to move into any required position. Lighting from the side or top is recommended, and windows should be placed on the right of children so that the mistress in giving a lesson from the black board should not place herself in the light. In arranging galleries, they should be so placed that the mistress is able to command and see all the children at a glance. We are told that "in point of economy and space, it is wasteful to place a gallery across the end of the room."

Benches and desks for writing are also required by the advanced infants, and may be placed in one corner of the schoolroom, or in the senior classroom. The desk described in our previous article is simplified for infants, on account of the drill it requires. The lifting flap, and sloping top, give place to simple flat tops, which are more suitable for the wooden bricks and Kinder-garten models, &c., required. Two sizes of desk are used; the larger is a flat desk, 11in. wide,  $1\frac{1}{2}$ in. thick, screwed to iron standard. The desk top is

19in. high, with footboard 4in. wide; seat and back rail fixed to standard, the former 8in. wide and 11in. high, slightly tipped up on its front edge; the distance from back rail to outer edge of desk is 1ft. 9in. In the smaller size, the desk is 17in. and seat 10in. high. The larger size is more useful.

A playground and appliances form necessary accompaniments to an infant-school. A covered exercise ground is also necessary, covered access to which should be provided.

The Home and Colonial Society, no less than other authorities on Infant Education, show the desirability of affording ample appliances for exercise and play, no less than the fittings of schools themselves. The Society mentioned suggests several such appliances:—1. A double inclined plane of planks, about 12ft. long, raised about 2 ft. 6in. from ground, with cross pieces at intervals to prevent slipping. 2. Wooden swings, or see-saws, made of plank, 12ft. long made to move on a fixed pivot in centre, about 18in. high, with handles at each end. 3. Parallel bars, 2ft. 9in. and 4ft. 9in. high, on posts 18in. apart. 4. Horizontal bars 3in. in diameter and 6ft. long, of different heights. 5. Climbing stand and ropes suspended.

Though we seldom see such simple and inexpensive physical appliances provided, we think their provision should be recognised in all schools, both infant and graded. Stimuli, physical and mental, are needed, but the first should lay the foundation for the latter. These kinds of apparatus would also lessen the boisterousness and noise of playgrounds and schools, which often make them anything but pleasant neighbours.

Coming to the details of "graded" schools, into which children pass after leaving the infant-school, we have six "standards" of examination, as set forth in Article 28 of the Code, and the classes are graded accordingly. Specific subjects are taught in the higher standards—as drawing, for which special grants are received from the Science and Art Department; and hence it is desirable in a school to provide for such specific subjects a reserve classroom, or even two or three. The "standards" are regarded as the minimum instruction, but other subjects may be taught under regulation.

The lower standards are more numerously attended than the higher; death will also reduce the number which reach the latter; though, on the other hand, the higher classes are generally the larger and older children, who require more space. This must be taken into account in planning classrooms. Mr. Robson thinks the simplest solution is to make both senior and junior classrooms provide for the maximum number of class (30 or 40) fitting the senior classroom with desks for a smaller number, or to do away with the division between and make one room for a smaller number.

Size of classrooms has already been touched upon, though it is a question how the proportion of space in school and classroom should be adjusted—whether the latter should be for 40, and the former for 30, or that the class numbers should be the same in both cases. We think a little larger space in the classroom may justifiably be permitted, seeing that when the classes are collectively assembled in the school-room, a closer arrangement of desks may be allowed. Double classrooms, in which the master and pupil-teacher work together for 60 or 80 children, are desirable, and may be considered the most economical treatment. Such a double classroom would be best placed crosswise to the schoolroom, and separate access given to each. This arrangement secures the advantages of supervision by the principal of his assistants at both ends, and through ventilation; though it often interferes with the side-lighting of schoolroom, unless the classrooms are so placed as to leave a portion of end of schoolroom free for windows. Of all the points which present the most difficulty to the school architect, the

position of the classrooms, so as not to interfere with the lighting and access of the main school is one of the greatest, and the limits and restriction of site often make it more so. Fireplaces are best placed near, or in the angle, of classroom.

The doors and fireplaces of schoolrooms demand some thought, so as to allow one side of the room to be free for desks. The fireplace should not be central with a class, or it will be inconvenient for the teachers. Inattention to this point is very frequent, besides wasteful of floor-space. We are recommended the north or north-east for the desk-side. Small schools may be 20 or 21ft. wide, though 18ft. was the old rule; 22ft., however, is better in large schools. As to length, this must be determined by the number of children and the number of desk rows, say five rows, on the dual desk system. Points of egress should be so arranged that the children from classrooms should not have to traverse the schoolroom in going out. This object is best attained by having the door placed at one corner, opening into the lobby, or staircase, separately. In a large school, two lobbies or entrances of this kind are necessary.

As Mr. Robson says: "Under every fresh set of conditions there is always one position and arrangement for each detail, better than any other," and the success of school-planning is in determining each of these successfully. Thus a window, door, or fireplace, must be placed so as to facilitate, rather than impede, the work of a school. The teacher's desk, and cupboard, and fresh air inlets, ventilators, &c., should be placed, for example, in particular reference to the facilities for seeing, ready access, and other immediate purpose required, without offering, on the other hand, any undue obstruction or inconvenience.

Mr. Robson does not say much on walls. We are told they should be of sufficient thickness to retain warmth and keep out cold and heat. Brick is recommended, of good colour and hardness. We do not see any mention of hollow walls, or whether they are approved of by the School Board. If they are not, we have only to say a great deal of valuable experience and science has been ignored, and an opportunity lost. Having had some experience in school construction, we know that hollow brick walls are of great value, sanitarily and otherwise. On the grounds of economy, dryness, nonconduction of heat and cold, impermeability to sound, facility of ventilation, &c., they demand recognition of every public body, and far surpass the thickest solid wall of brick or stone.

#### HISTORIC ART STUDIES.

THE ROMANESQUE STYLE IN GERMANY AND SCANDINAVIA, AND GOTHIC ARCHITECTURE IN FRANCE.

(With Double-Page Illustration.)

THE influence which Christianity exercised on humanity may be classified and brought under the four following headings:—(a.) Christianity affected our senses, and through them our imagination. The result of this effect may be traced in the composition of symbols and allegories often taken from ancient times, blending thus into one the ancient and Christian modes of expressing the inexpressible in conventional forms. (b.) Christianity worked on our will and purpose of action, and thus produced new ethics, which again had to agree in all instances with the morals of the ancient world wherever the real laws of our spiritual and material nature were understood. (c.) Christianity roused us to self-sacrifice, inducing wild rapture and boundless zeal; driving men and women into monasteries and nunneries, exciting them to crusades and self-inflicted tortures. Like the dreamy enthusiasts of Brahmanism and Buddhism, the Christians looked upon matter as of evil. This similarity of religious prin-



ciples caused remarkable analogies between the plans and decoration of Christian churches and Buddhistic temples, and the ornamental sculptures representing scenes from the life of Buddha or of Christ. (d.) Christianity elevated our powers of reflection on the divine, and on our duty towards God and man from a rational point of view. Under this last influence the word was thought more important than the form; the essence was cherished more than the mode of expression. Under the first and second impressions the products of Byzantine and Romanesque art were executed; to the third we owe Gothic forms, and under the fourth the works of Renaissance art were produced. In the past, and even at the present time, at certain periods of art-development, the one or the other, or some combination of these four elements, takes hold of a nation, and such a nation condemns all who, consciously or unconsciously, are influenced by any of the other elements, looking upon them as strangers, or altogether dangerous to religion and art. The imaginative and sentimental artist looks with contempt at the Classic artist, as devoted to heathenish forms, though all art-forms took their origin from the same source; and the cool, reflecting, intellectual reasoner despises those who think less and believe more—who show their piety more in forms than in mere words. Both are wrong; for both forget that the art-period of every nation developed according to the religious feelings and the moral, social, political, and intellectual atmosphere formed by these feelings. They venture, in their utter ignorance, to judge past ages with the views or prejudices of modern times, or wish to resuscitate obsolete forms in our days, with totally different sentiments. In art, the mind forms the Paradise from which flow forth into reality four sacred streams. The first originates in our senses, the second in our will, the third in our imagination, and the fourth in our intellect. The first is the source of our artistic, the second of our ethical, the third of our pathological, and the fourth of our scientific, phenomena. As there is no colour without light, no art can exist without sensuous perceptions acting upon our nervous system, and through it on our imaginative and intellectual faculties. God and His dwelling, His ministering angels, and saints, and martyrs, were to be brought either into symbolical or such forms as should speak most powerfully to our senses. As with the Brahmans and Buddhists, the Egyptians, Greeks, and Romans, so also with the Christians during the Middle Ages everything was tinged with a religious feeling. Swords were forged in the form of crosses, spears assumed the shape of nails. The ground-plan of the churches assumed the form of the cross. The outer world was considered full of sin, and was to be shut out through thick walls and small windows from the house of God. Men delighted in melancholy contemplation and sanguinary sufferings, or filled the air with joyful songs whilst they were starving themselves to death or fast sinking under the effects of pious exhaustion. They revelled in a sense of inward bliss when they felt their bodies crumbling into dust. This spirit, like the analogous feelings in the Buddhistic religion, produced gloomy vaulted churches with heavy arches, mighty piers with horizontally-suspended, stiff, ungainly angels with sanctimoniously-turned-up eyes, monstrously big heads, with still bigger aureola; representations of martyrs suffering torment—being roasted alive, boiled in oil, sawn into pieces, pinched with red-hot tongs, quartered, or crushed by millstones. The faces of saints and martyrs were painted with a solution of white chalk, projecting from a dark ground, to make them look more ghastly. Churches abounded with such representations, for which they were fit abodes. Influenced by the growing civilisation in Germany, some improvements took place under the freer

Government of Otho the Great and his followers, who, with all their excellent qualities, were, however, mere children in taste and matters of art. The depressed mind of Europe was reflected in the arched and flat-roofed basilicas—like that of Hecklingen (see Fig. 1), or the church of the nunnery at Paulinenzelle (see Figs. 2—section; and 3—ground plan), with five apses, in commemoration of the five wounds of Christ. The dimensions are heavy, and the details of columns, piers, and capitals clumsy. The dome at Naumburg (see Figs. 4 and 5) undoubtedly belongs to the transition style from Romanesque to Gothic architecture. The church was probably planned in the thirteenth century, and shows in the elongated eastern apsis the tendency which we deprecate in some of our English cathedrals (see BUILDING NEWS, June 19, 1874). Whilst pointed arches predominate in the vaulting, the round arch is used on the wall separating the choir from the nave of the church. The chapel of the Castle at Freiburg, on the Unstrutt (see Fig. 6), is a square building of small dimensions, provided with a ceiling formed by four cross-vaults. The four round arches connecting the walls are marked with a kind of fringe ornament. The foliation of the principal ribs and the exquisite treatment of the capitals remind us of the Romanesque style in England. The portal of the Scotch Church, dedicated to St. James, at Ratisbon (see Fig. 7), is richly decorated with strictly Italo-Romanesque details. The grotesque animal forms on both sides of the portico are analogous to some Irish, Scotch, and even Mexican, symbols, especially the monster, half-serpent, half-lion, with a ball in its mouth. The pillars and half-columns are decorated in an Indian spirit, and the animals, as well as the caryatides supporting the round arches, unite Classic and Asiatic patterns for the purpose of decorating a Christian church.

The Swedes and Norwegians have very little to show in the genuine Romanesque style; the plans and decorations of their earliest churches were taken either from England or the North of Germany. The church of Warnheim (see Fig. 8), forming part of a Cistercian Monastery erected towards the middle of the twelfth century, is in the Romanesque style. The simplicity and sternness in the architectural lines, and the correctness of the elegant capitals, enable us to range the building amongst the very best specimens constructed at the period. The apsis is semi-circular, and the windows are peculiarly arranged. Some Mongol influences may be traced in the wooden churches of Norway, which resemble Chinese pagodas externally and Romanesque basilicas with three aisles internally. The church of Urnes (see Figs. 9—interior; 10, 11, and 12—ornamental details) is an example of these buildings. The two side-aisles have slanting, flat roofs, whilst the nave has a semi-circular covering of joined boards. The choir terminates in a straight line, and arcades crowned by a large crucifix rise above it. The ground-plan is nearly square, and the whole church is constructed of boards, the joints of which are filled in with moss. Runic carvings, fantastically-entwined animals, plants, and creepers adorn the capitals (see Figs. 11 and 12), and also some panels of the exterior (see Fig. 10). Mouldings and capitals remind us of some of the old Saxon and Anglo-Romanesque decorative details.

The pointed arch, one of the most characteristic elements of Gothic architecture, was used long before Christ in some Buddhistic temples. The whole arrangement of the Chaitya Cave, with its triforium, and ribbed roof in stone, approaches, in all its details, a Gothic dome. This is still more strongly apparent in the Lomas Rishi Cave, at Behar, where the arches over the square entrance are encased in a frame having the perfect design of the pointed Gothic arch. The Aryan temples, in the far south-east, already

showed a tendency to allow the vertical line to predominate over the horizontal. Whether men turn their eyes towards a future world, full with heavenly bliss, or hope to enter into Nirvâna, their spiritual striving upwards finds expression in analogous architectural lines, which carry the mind with an irresistible longing towards the infinite, far from everything earthly, and lead to real life, happiness, and immortality. The Buddhist monks constructed temples surrounded by cloisters, and their example was followed by the Christian monks. As with the Buddhists, the cloisters were to serve as a means of checking the "godless" reasoning powers of men; but in spite of this tendency, they served to further the mighty and vigorous artistic progress of humanity. From the times of the great Hildebrand (Pope Gregory VII.), the Church increased in wealth, power, taste, and learning. The Romanesque style died out by degrees, in consequence of the revival of Classic learning in the gloomy recesses of the cloisters and monasteries. Abelard spoke; Arnold, of Brescia taught; Thomas Aquinas, the Angelic Doctor, philosophised, and prepared the great Gothic churches, that were really scholastic dissertations, theological discussions, natural historical essays hewn in stone, inspired by the exceptional vivifying power of this period, the "Ecclesia triumphans." The Old and New Testaments were to be written in relief. Every stone was to impress the believers with a severe lesson in Christian duty. Symbolism, as with the Egyptians, became dominant. On capitals, bases, columns, piers, ribs, windows, and porches we see angels, saints, martyrs, confessors, prophets, the philosophers of ancient Greece, the heroes of Rome and Judæa, crowding, in immense multitudes, to glorify the triune God—the petrified "logos." Nature, from the barren rock to the wildest vegetation—from the creeping worm to the roaring lion—was represented. Dogmatically wise doctors, with horns protruding from their square college-caps, tigers with human faces, nuns in humiliating positions, priests hanging from corbels, bishops transfigured into acrobats, decorated the walls, porches, and spires of the churches. The Last Judgment—Hell, with all its horrors, invented to torment men with the ravings of an over-heated imagination—figured in the broad tympanum over the entrance-doors of cathedrals. Nature, as with the Zoroastrians, was rent asunder, and divided into kingdoms of light and darkness. Matter was accursed on these walls, and the lofty spirit of man exalted. Woman was looked upon as a saint, if she renounced all earthly love and sank into ecstasy, dying away "in the insufferable flame of divine love." The Greeks had their Anakreon, who sang of love; we had now clerks in holy orders, divines, nuns, and monks who wrote in the same strain, changing Cupid into Christ, Venus into the Virgin Mary, and sang with trembling lips and throbbing hearts:

"Into love's furnace I am cast;  
I burn, I languish, pine, and waste.  
O, love divine! how sharp thy dart!  
How deep the wound that galls my heart!  
As wax in heat, so from above  
My smitten soul dissolves in love," &c.

To understand the architectural products as they grew out of dim cloisters and a gigantic religious enthusiasm during the thirteenth, fourteenth, and fifteenth centuries, we must study Dante and Vincent de Beauvais. The cathedrals of France were the most imposing expression of these feelings, and may still be considered as unsurpassed specimens of the pure and best Gothic style. A church constructed in the new form was called "opus Francigenum," which must not be taken in the meaning of "French," but of Frank, or rather Teuton work. In this spirit the church of Notre Dame, at Paris, was conceived. (See Figs. 13—front view; and 14—ground-plan). In spite of its heavy proportions, depressed columns, broad cross-vaults



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BAPTIST, SPALDING.—MISSION CHURCH OF  
S. MARY THE VIRGIN, PIMLICO.

and seven aisles, it is an imposing architectural product. The same spirit erected the cathedral of Chartres (see Fig. 15), of which Napoleon I. said, "An atheist must feel very uncomfortable in this place." This church is an abode detached from the outer world, enshrined in mystic piety, to proclaim Christ's glorification and dominion. On entering the church we lose ourselves in a gloomy twilight. The rays of the sun enter through comparatively narrow apertures, forming large stars; and here and there the brilliant beam falls upon marble waves that reflect all the colours of a prism. No pews, with their commercial meanness, stiff regularity, and divisions, disfigure the mighty nave and aisles of the church. The world is carved on porches and walls, and the world's grand drama is performed in all its scenes in the church. In one corner a newly-born child is received into the community of believers. In another the weary wanderer who has finished his earthly pilgrimage is dismissed with a mournful *Requiescat in pace*. He is followed into the broad daylight, and thence to the black grave, by those whom he loved and who loved him, who weep bitter tears to his memory. Through the same door through which the dead makes his final "exit," a procession of gaily-dressed men and women joyfully enters; amongst them is a young girl dressed in white, thickly veiled, with a wreath of orange blossoms on her brow, and by her side a young man with flowers in his hand, beaming with joy, hope, and love. They are going to be married. They pass an eloquent preacher who at that very moment is thundering against the vanity of this world, and the fleeting instability of all earthly things. Mysterious masses are performed in mysterious side chapels; masses for the souls of the departed, masses for the sick, masses as thanksgivings for some special favour bestowed by some particular saint on some particular devotee. A bashful girl makes scanty offerings to the source of all love, to move the heart of her lover to come to a final decision; whilst on the opposite side a young man sends up fervent prayers to Christ to move the heart of one who, though lovely as the morning dawn, is as cold to him as the stone pillars that surround him. Penitents partake of the Holy Communion, pious confidence and faith beaming in their eyes. In the Gothic domes of Chartres, of Bourges (see Fig. 16), Amiens (see Fig. 17), and Orleans (see Figs. 18 and 19), this religious life was continual, and produced those huge cathedrals of spiritualised dogmatic Roman Catholicism. Take away this spirit, and Gothic churches become mock imitations, crying falsehoods—because the moving force is wanting, the idea which served as the first germ out of which grew the artistic plant no longer exists. Gothic architecture flourished at a time when science was not yet conscious of its power—when the whole of humanity was drawn upwards, when man hoped to find a solution of his destiny, and believed firmly that the mineral, vegetable, and animal kingdoms formed a powerful combination to entice him to evil. Everything which had form, shape, or body, was looked upon as the devil's work. A visible reconciliation was necessitated, and the Gothic house of God was to be symbolically the mikrokosmos encircling the makrokosmos. The mineral kingdom may be traced in the huge fundamental rocks, and the entire flora are represented. The rose or wheel figures as the symbol of man's life (see Fig. 20—the rose of the Cathedral at Rheims; and Fig. 21—the rose of the

Cathedral of Amiens), or as an imitation of the rays of light. Fruits ripened by the rays of the sun were used to ornament capitals, columns, finials, and pinnacles. All the fauna then known were used, and served to form new fantastic combinations. Real animals are contrasted with impossible monsters, and reality and imagination go hand in hand. The winged dragon, spitting fire, faces the lion; the winged serpent, the horse; imaginary and real forms support the statues, are interlaced on capitals, cover the surface of tympana, and creep along the pointed arches. The geometrical element predominates, but it is not everything. The vegetation used in Gothic architecture is more luxuriant than in the Egyptian, Assyrian, or even Indian constructions, and the animal kingdom is undoubtedly more extensively utilised than it was in Greece or Rome. But there is another most important feature in genuine Gothic architecture. Man as man, not only as a god or a hero or a faun, takes—both in the interior and on the exterior, within the walls and on the walls—his right place. Man has, in *abstracto* and *concreto*, his position as saint, or as toiling, hard-working creature, in these masses of stone. Man is not forgotten in the thickest vegetation, in the grand menagerie of wild and tame animals. The Gothic church is the church of man—with his double nature—animal and divine, material and spiritual, static and dynamic. Every Gothic church was, in reality, an encyclopædia, sacred and doctrinal, ethic and scientific—hewn in stone. "The speculum universale" or "quadruplex," (that is, the "speculum naturale, doctrinale, morale, and historiale") is the book that serves as a key to a correct understanding of these churches. If the variety of symbolic and allegoric ornamentation, the statuary representing the twelve months and the twelve apostles, the seven deadly sins, the five wounds of Christ, the scenes from natural history, the heathen philosophers, the prophets, and sybils, be once removed, Gothic art sinks into insignificance. If our modern Gothicists cannot give us back the blind fanaticism of faith, the ignorance of the laws of nature, the horned Devil with his tail and fiery tongue, the wealth of an omnipotent hierarchy; they must not attempt to construct mean buildings which they are pleased to christen Gothic. Mr. John Ruskin describes our art in his "Seven Lamps of Architecture" as full of "formalised deformity, shrivelled-up precision, starved accuracy, and minute misanthropy." The cause of this is, that we attempt to reproduce the works of certain art periods without understanding the spirit of the past, or even attempting to familiarise ourselves with the wants of our age. The results are, then, wasted, unsubstantial, cramped, poor, miserable, and petty buildings, neatly labelled Gothic. Let us not imitate the churches of France, but endeavour to devote ourselves to something more in harmony with our cold, calculating spirit, and love of comfort.

G. G. ZERFF.

## OUR LITHOGRAPHIC ILLUSTRATIONS.

## DESIGN FOR BANK, WORCESTER.

The design for the proposed bank at Worcester, for the Stourbridge and Worcester Bank, would be of red brick, with Farleigh Down red-bed stone dressings; all exterior walls hollow. On account of the building being hemmed in on two sides entirely, and almost the whole width of the back also having to consider the right of ancient lights, considerable difficulties arose in obtaining a convenient plan, with sufficient light and ventilation. It was therefore proposed to obviate this by means of a central area. The strong room,

formed of double walls, would be in the basement. The manager's living apartments are on the first and second floors, except the offices, which are at the back. The authors of the design are Messrs. Giles and Gane, of 7, Furnival's Inn, E.C.

## HOUSE IN NOTTE-STREET, PLYMOUTH.

Of all the old towns in Britain, few possess such a scanty collection of their ancient edifices as Plymouth. I think there are but three or four (at the most) now in existence, viz., "Palace Court," Abbey Close; a dwelling-house in S. Andrew's-street, and another in Notte-street, the subject of illustration this week. Although a beautiful type of the half-timber architecture, it suffers somewhat by contrast with so many brilliant and modern examples of the same class recently published in the pages of the BUILDING NEWS. This building is in no way historically connected, but for many years past, like its brethren, it has been silently making an appeal to the profession for permission to lend its beauties to the nineteenth century.

H. A. G.

## ROMANESQUE IN GERMANY AND SCANDINAVIA, AND GOTHIC ARCHITECTURE IN FRANCE.

For descriptions of subjects in this double-page illustration, see article by Dr. Zerff, p. 80.

## CHURCH OF S. JOHN THE BAPTIST, SPALDING.

This church, with vicarage-house and schools, of which we give an exterior view, is being built by Miss M. A. Johnson, of Spalding. The architect is Mr. R. J. Withers, of Adam-street, Adelphi. The church is built of the following materials:—Ancaster stone for the external walling, with Casterton stone dressings. The interior dressings, columns, caps, bases, and walling of the chancel are of Bath stone. The nave and aisle walls are finished with plaster. The roof is of waggon-shaped rafters, with the beams left open, and is constructed of deal. The seat benches in the chancel are of oak, those in the nave of deal. The fixed seats afford accommodation for 420 worshippers, and chairs are provided for 130, making a total of 550 sittings. The nave is 73ft. long, 26ft. wide, 30ft. high to top of wall plate, and 50ft. to ridge. The chancel is 16ft. long, 23ft. wide, 28ft. to top of wall plate, and 44ft. to ridge. The aisles are 10ft. wide. A vestry is provided on the south side of the chancel, with a choir vestry in a crypt under the east end of the chancel, the windows of which are shown in the view. The contract sum for the church is £7,057. The builder is Mr. Huddleston, of Lincoln, and the clerk of works, Mr. T. Leigh.

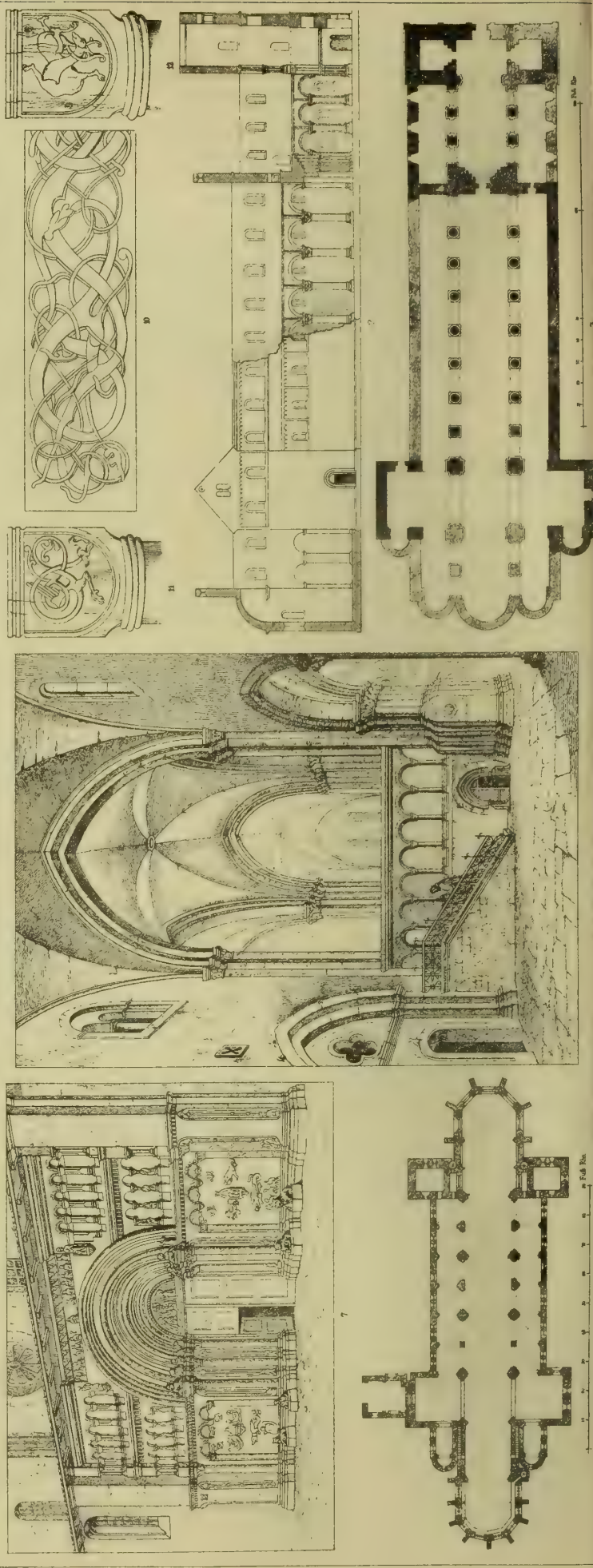
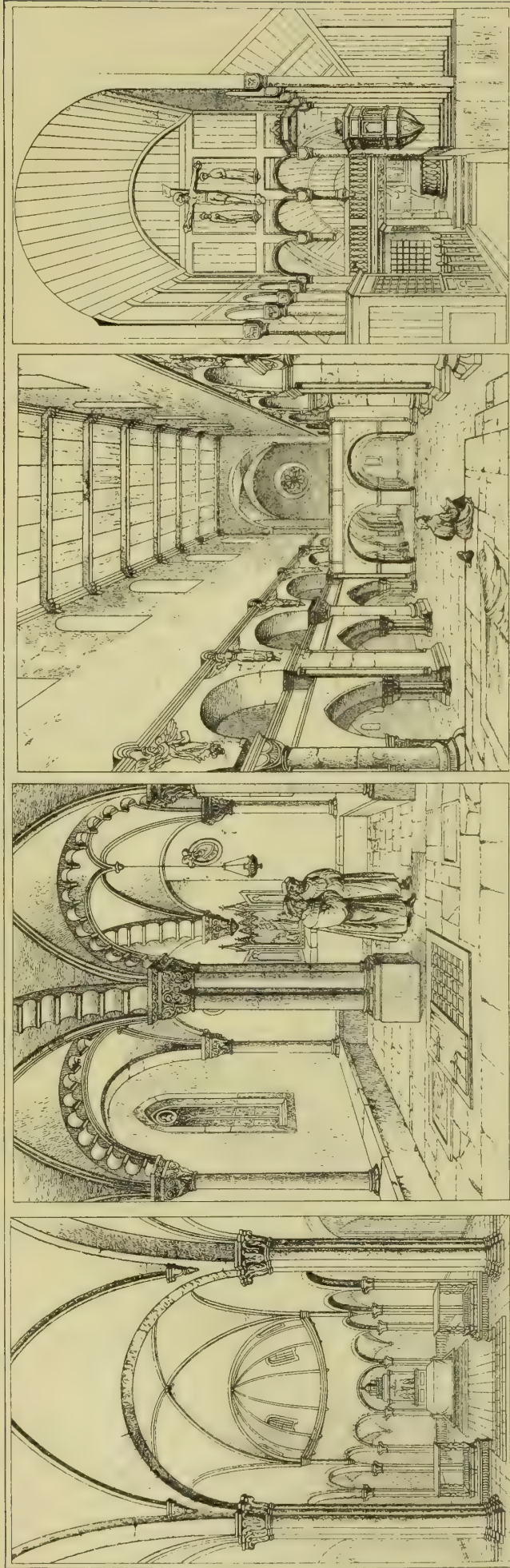
## CHURCH OF S. MARY THE VIRGIN, PIMLICO.

This church was opened the week before last, and has been built from the designs of Mr. R. J. Withers, architect. The site on which the building stands is immediately over the Metropolitan District Railway, so that difficulties of an unusual character had to be overcome in forming the foundations. They were met, as we described at the time, by excavating trenches down to the haunches of the railway arch under the nave arcades, and constructing large concrete arches, so as to carry the nave arcades in a perfectly independent manner with regard to the tunnel, so that the latter can be repaired at any time without affecting the foundations of the church. The church consists of a nave, 73ft. long by 32ft. wide, and 39ft. to top of wall plate; aisles 7ft. wide as passages and an apsidal sanctuary, the chancel extending west one bay of the nave arcade, and separated from the nave by a dwarf stone screen. Vestry and sacristy are placed at the north-east corner of the building. Heating is carried on by hot-water pipes. The whole of the flooring is of encaustic tiles, under which is a bed of concrete 1ft. thick, to prevent as much as possible the sound being heard of the trains passing below. The church is lit by clerestory and end windows; the aisles are windowless. The material of the walls inside and out is red brick with stone dressings. The roof is covered with slates, and is surmounted by a *fêche*. Sittings are provided for 492 persons. The cost has been about £5,000. The builder was Mr. Cowland, and the clerk of works, Mr. Laidler.





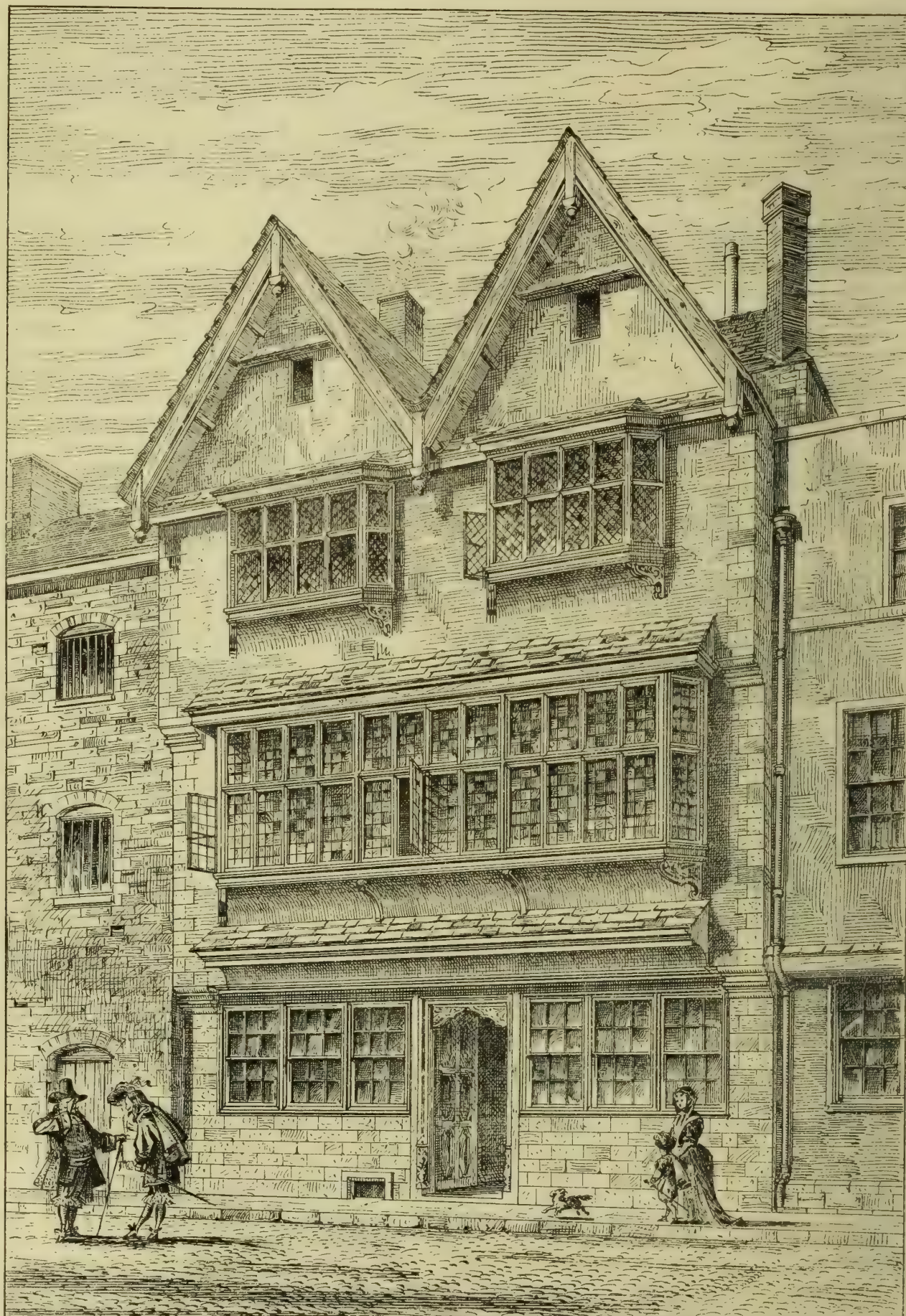












HOUSE IN NOTTE ST. PLYMOUTH

HERBERT A. GRIBBLE. DEL.







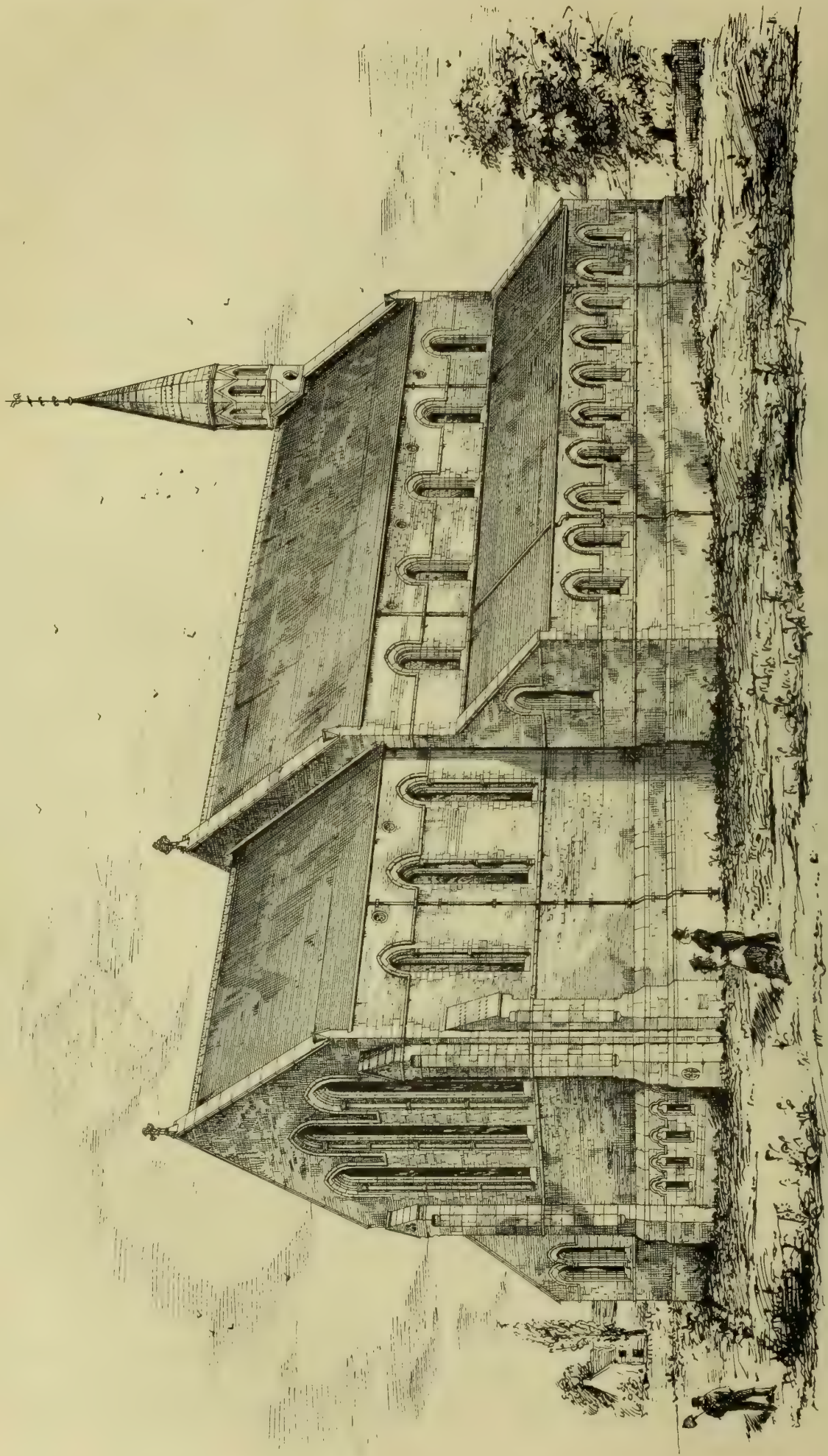


Photo-Lithographed & Printed by James Akerman, St. Gray's Inn Road, W.C.

CHURCH OF ST JOHN BAPTIST, SPALDING, LINCOLNSHIRE.

BUILT AND ENDOWED BY MISS M A. JOHNSON. A.D. 1874.

R. I. WITHERS, ARCHITECT.





Photo Lithographed & Printed by James Akerman, 51, Gray's Inn Road, W.C.

MISSION CHURCH OF S. MARY THE VIRGIN,  
GRAHAM STREET, PIMLICO, LONDON. S.W.

R. I. WITHERS, ARCHITECT.







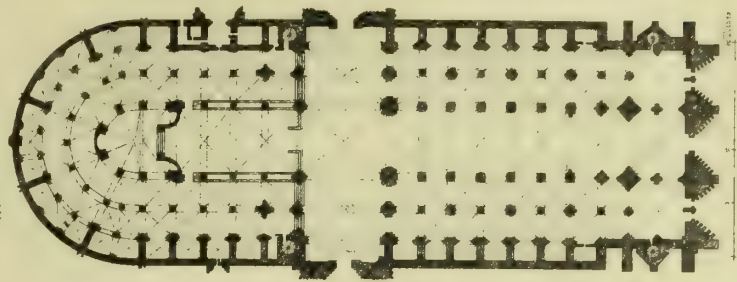
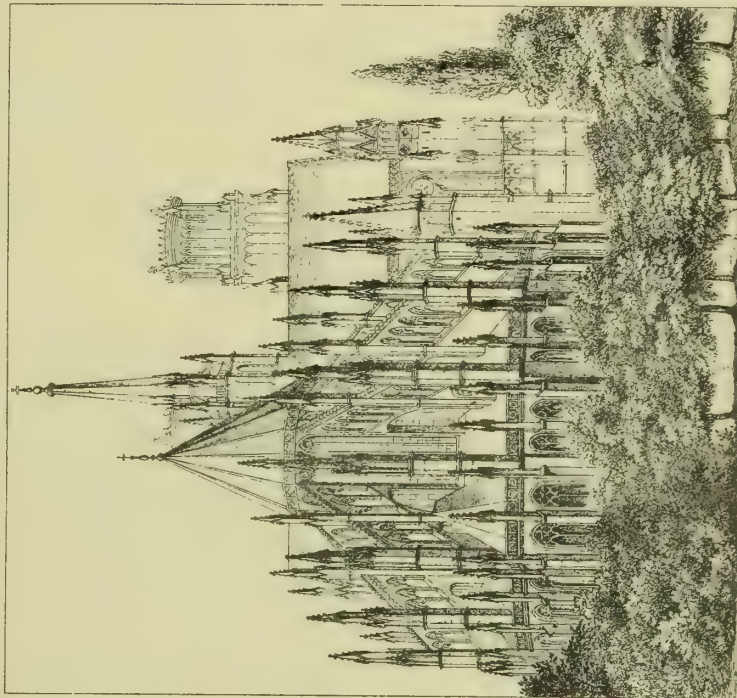
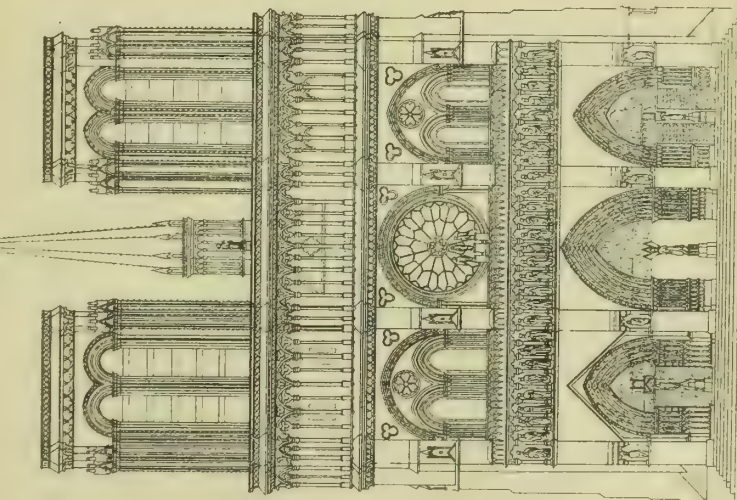
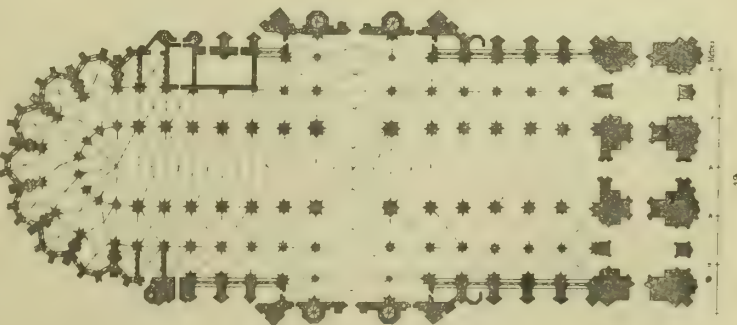
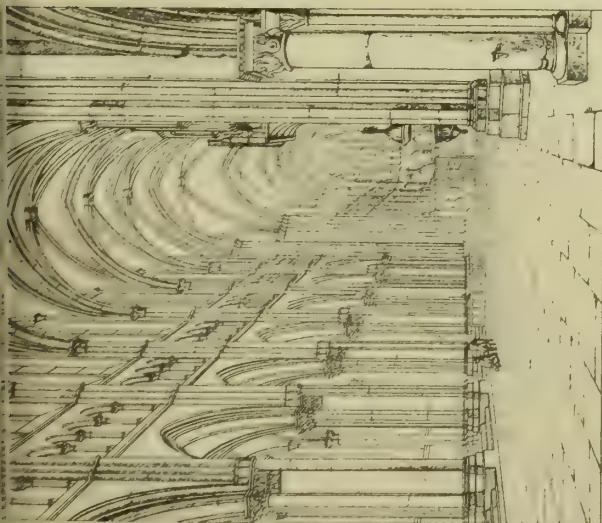
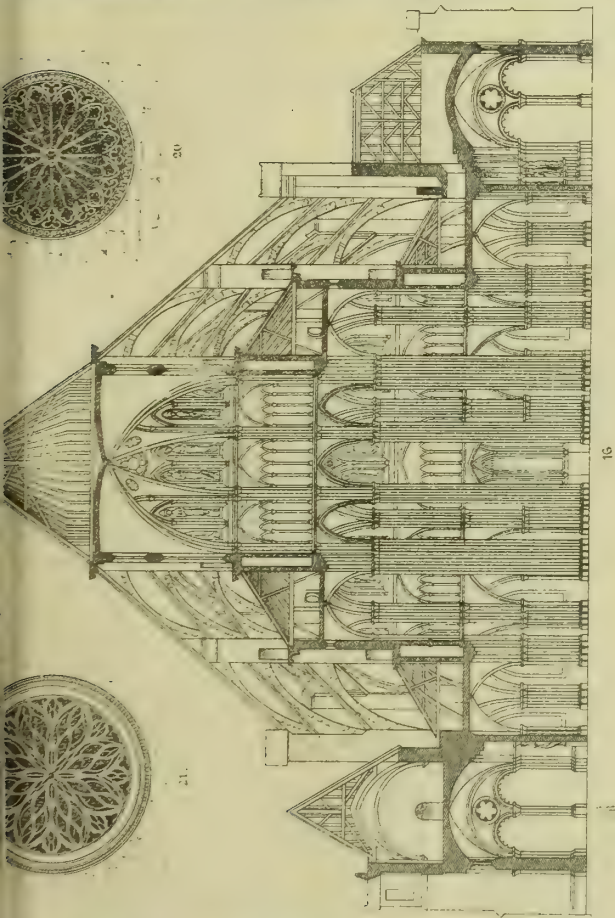
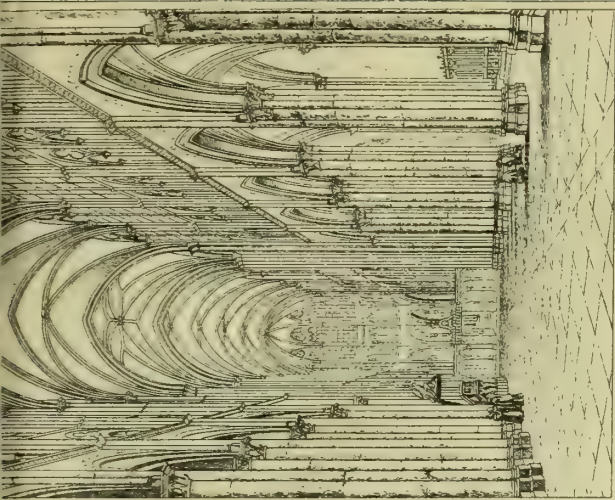
*Proposed Bank Worcester.  
Messrs. Giles and Gane Architects.  
Forewards Lane High Holborn E.C.*

















## GASES IN SEWERS.

IT is singular, and exhibits an apathy among sanitary authorities and engineers, that the nature of sewer gas has been so long neglected. Until the nature of sewer gas is ascertained, the temperature of the sewers, velocity of sewer currents, &c., it is impossible any nearer approach than we have already made towards the theory of sewer ventilation can exist. The Association of Sanitary Engineers, which is now established, will, we hope, organise some efficient plan of collecting data and publishing facts for the mutual benefit of all sanitary boards.

We here quote Mr. J. J. Nicholson's mode of obtaining the sewer gas at Sunderland for analysis. He says: "I made an examination at the end of September, 1871, obtaining the air by fixing a bell-mouthed pipe of about 10in. diameter into the wall of one of the main sewers at its upper end; from this I carried up a small pipe into a temporary house erected near the spot, and drew the air out with an air respirator, taking care to have every joint air-tight, and to draw out a few thousand cubic inches every time before commencing. This sewer drains a considerable section of the town, and was selected for examination because it was considered more thoroughly trapped than any other, and has its outlet into the river, under water at all times except the low-water spring tides." The composition of the air was as follows:—

Nitrogen, 81.1; Oxygen, 18.4; Carbonic acid, 0.5; with traces of sulphuretted hydrogen and ammonia.

Let us compare this analysis with that Dr. Letheby gives of his experiments in London:—

Nitrogen, 79.96; Oxygen, 19.51; Carbonic acid, 0.53; with traces of sulphuretted hydrogen.

It will be found that sewer gas varies considerably, though in all the analyses we have nitrogen as the greatest constituent. Sulphuretted hydrogen, the most poisonous and fetid of all gases, is found in small quantities. Carbonic acid gas exists in rather greater quantity, though still very small, or from almost imperceptible traces to 2.3. It has, though half again as heavy as atmospheric air, large powers of diffusion. In old sewers and cess-pools of deposit these two dangerous gases exist in large quantities. From the mean of seven analyses, it is found that the bulk of sewer gas, or 79.0 of it, is nitrogen, which is much lighter than common air, its specific gravity being 0.972. Now nitrogen composes a large percentage of the air, which is 20.9 oxygen and 79.1 nitrogen, while the analysis of sewer air gives the proportion of 19.26 oxygen and 78.12 nitrogen.

Again, nitrogen is both tasteless and inodorous. These facts, we contend, show that objection against free sewer ventilation is groundless—that no ill effect could result from open ventilators or outlets in soil pipes. Mr. Ellice-Clark, C.E., in a paper read before the Association of Sanitary Engineers, points to the harmlessness of such a gas in the sewers, as nearly as large a proportion exists in the air we breathe. But this does not, we think, show the futility of ventilation, or its comparative uselessness. We must remember these gases are so diffusive, elastic, and so much lighter than the atmospheric air, that, as a body, they exercise a considerable influence in displacing the purer atmosphere.

As to the temperature of sewers, Mr. Haywood, the Engineer to the City of London, states, from experiments extending over a year, the mean temperature of the London sewers to be 55.55°, or 5.11° above that of the outer air. Mr. Baldwin Latham states the Croydon sewers are pretty nearly uniform during the year, on 220 days being lower than the temperature outside. Other sewers have been found to average 1° below the outer air in summer, and 10° above in winter, or 45° in the winter. Mr. Clark thinks if the sewers were better flushed, the temperature of sewers could be kept so low as to practically prevent the formation of baneful gases; and that careful attention to flushing of sewers, even though ventilated, will effect a large diminution in the volume of dangerous gases.

We do not see why ventilation should not be as efficacious as flushing; and to this point more especially we will refer in another article.

## THE MANCHESTER SOCIETY OF ARCHITECTS.

THIS Society held its annual meeting on the 22nd of June last. Judging from the printed report sent us, the Society enjoys only a languid existence. The number of members is 25. The expenditure during the past year has been £36. 4s. 11d., a balance of £1. 3s. 1½d. being due to the secretary. The Manchester architects are not likely to explode with enthusiasm for their Society. The following is the only paragraph in the report of general interest, viz.:—"The Council have felt called upon to protest against the course taken by the new Wardens of the Manchester Cathedral, in placing the continuance of the restoration of the building in the hands of another architect, without in any way communicating with the gentleman under whose direction the work had been carried on for 25 years. The Wardens are, as you are aware, not in any way legally bound by the acts of their predecessors, therefore the Council could do nothing but protest against such a course. The explanation given by the Senior Warden (in reply) was to the effect that no reflection was intended upon the professional character of the former architect, but was in other respects, in the opinion of the Council, very unsatisfactory. The gentleman who has accepted the commission under these circumstances is not, the Council are glad to state, a member of the Society."

## THE SEWAGE QUESTION.—A CHEAPER PRECIPITATING AGENT.\*

CONVINCED of the superiority of precipitation over filtration or irrigation as a means of purifying sewage water, and that the best material yet found for this purpose is alumina, Mr. Rich has devoted his attention to the discovery of a means of cheapening the production of some form of soluble alumina identical in its action with sulphate of alumina, which should be so effective that a small quantity would perform the work hitherto done by the large quantities characteristic of other processes, especially those in which any raw material, such as clay, enters. He set to work and experimented on the alum shale which crops up at Whitby, Guisborough, and other parts of England and Scotland. The result of his experiments, broadly stated, is that sulphate of alumina may now be profitably manufactured on a large scale at 25s. or 30s. a ton. A still more satisfactory result is, however, to be obtained. Hydrochlorate of ammonia is just as suitable for sewage purposes as the sulphate, and it just happens that an economy may be practised by converting the sulphate of alumina into hydrochlorate. In the soda manufacture, the sulphuric acid used is very expensive. In its place, according to Mr. Rich, it is only necessary to substitute sulphate of alumina, and, by cooling the liquor, sulphate of soda will crystallise out, and hydrochlorate of alumina will remain in its place; and if this process were applied on a large scale, it seems probable that the sulphuric acid, or rather the sulphate of soda produced, would cover the whole or nearly the whole cost of the process and materials, and leave the hydrochlorate of ammonia to be sold for what it would fetch for sewage purposes. At any rate, there seems a good prospect that the manufacture of sewage materials may be made to fit into the present soda process. The more important points in Mr. Rich's suggestions have already been made the subjects of patents, and will doubtless receive attention from practical chemists.

It will probably be remembered that in April, 1872, treatment of sewage with alumina was tried at Tottenham, and its success fully established, according to the reports of Professor Atfield and Mr. P. P. Marshall, the engineer to the Tottenham Local Board.

## COMPETITIONS.

PARIS.—Seventy-five architects have sent in plans for the proposed Church of the Sacred Heart at Montmartre. They have selected six of their number to form part of the jury which is to award the prizes, consisting of the sums of 12,000, 8,000, and 5,000 francs, and seven sums of 1,500 francs each. All the plans sent in are to be exhibited in one of the wings of the Palace of Industry.

\*"The Sewage Question." By SIDNEY W. RICH. London: 20, Exeter-street, Strand.

## THE ARCHÆOLOGICAL SOCIETIES.

THE meeting of the Royal Archæological Institute at Ripon opens on Tuesday next, the 21st, when, after a reception by the Mayor and luncheon at the Town Hall, the Cathedral will be visited with Sir Gilbert Scott, and at half-past eight in the evening Lord Ripon will deliver his inaugural address as President of the meeting. On Wednesday Fountains will be visited with Mr. Parker and Mr. Sharpe. Thursday is appointed for Richmond, where Mr. Clark will discourse. On Friday there will be an expedition to the Roman antiquities of Castle Dykes and Thornborough, and to Bedale. Saturday is appointed for Wensley and Middleham, Monday for Byland and Rievaulx. On Tuesday the meeting will break up; but an extra day at York on Wednesday, under the guidance of Mr. Clark, will attract and detain many members. The British Archæological Association meets this year at Bristol, early in August. The Kent Society meets at Folkestone on the 29th of July; the first day will be occupied with Folkestone itself and the Roman or British camp, Paddlesworth, the highest ground in Kent, and the little Norman church. On Thursday Horton Priory, Elham, Lydinge, and Brabourne will be visited.

## PARLIAMENTARY NOTES.

SOUTH KENSINGTON MUSEUM.—Viscount Sandon, on Thursday week, in answer to Mr. Cowper-Temple, said there were no funds available for continuing the decorations at South Kensington Museum, and no further steps would be taken until the whole question of the Museum had been taken into consideration.

THE SLAUGHTER-HOUSES, &c., BILL.—This measure, which has just been printed, has for its object "to regulate and otherwise deal with" slaughter-houses and certain other businesses in the metropolis. The whole Bill contains only fourteen clauses. It provides that if any person establishes anew within the limits of the Bill the business of soap-boiler, tallow-melter, or knacker, he shall incur a penalty not exceeding £50 in respect of the establishment, and not exceeding £50 per day for carrying on such business. If any person establishes anew the business of fellmonger, tripe-boiler, or slaughterer of cattle without consent of the local authority, similar penalties as above are imposed. The local authority may, from time to time, make, alter, and repeal bye-laws for regulating the conduct of any business specified by the Bill, but any such alterations, &c., must be approved by the Local Government Board. If, within four months of the passing of the Act, the local authority fail to exercise their powers under the Act, the Local Government Board may make "bye-laws of their own motion." Offences and penalties are to be prosecuted and recovered under the Summary Jurisdiction Act, from which appeal can be made to Quarter Sessions. The fee for establishing anew any sanctioned business is not to exceed 10s. A business is to be deemed established "anew" if it is removed from one set of premises to any other, or renewed after being discontinued for six months or upwards, or on premises enlarged by more than one-half. Sections 55 and 56 of the 7th and 8th Vict., cap. 184, will be repealed by the new Act.

## CHIPS.

Mr. Lee, architect, has been instructed by the Hackney Board of Guardians to prepare plans for new vagrant or casual wards in connection with the workhouse. The "cellular" system is to be adopted.

The Lambeth Board of Guardians have appointed Mr. F. H. Fowler, of Fleet-street, architect for the new infirmary about to be built adjoining the new workhouse buildings at Kennington. The Guardians have agreed to pay the architect a commission of 3½ per cent. upon the outlay.

The memorial-stone of a newly-erected Mission Room was laid on Thursday week, at Leicester. The place has been built from the designs of Mr. J. M. McAllister, in the Byzantine style, and is to accommodate 600 persons. The walling is of red brick, with dressings of Pillough stone. William Gimson and Sons were the builders.

It is proposed by a committee of the Corporation of London to take down and rebuild the Monument, as the cheapest way of effecting an improvement in connection with the proposed new street in that part of the city.



## Building Intelligence.

### CHURCHES AND CHAPELS.

**EDINBURGH.**—A new Presbyterian Church is about to be erected in London-road, Edinburgh, from the designs of Mr. R. Morham, jun., City Superintendent. The style will be Gothic, and accommodation will be provided for 920 persons. The interior of the building will measure 72ft. in length by 63ft. in width, and galleries will be carried round three sides of the building on iron girders, the use of supporting columns being dispensed with. There will be a tower and spire 160ft. in height. A basement story half sunk towards the front, but well lighted on three sides, affords a large hall for Sunday-school or congregational purposes.

### BUILDINGS.

**EDINBURGH.**—New offices are about to be erected for the Union Bank in Edinburgh. Mr. David Bryce, R.S.A., is the architect. The facade presents three floors, with attics, over a sunk basement. In the centre of the ground floor is the main entrance, approached through a portico of Ionic columns, two of which are placed on each side. The doorway is flanked with pilasters, and surmounted by a semicircular pediment enriched with carving. On either side of this central feature are three plain windows, separated by massive piers, and at each end of the block is a doorway and portico repeating the details of the main entrance on a smaller scale. The main entrance gives access to a spacious hall, on one side of which, with windows to the front, are a waiting-room and room for secretary's clerks; and on the other, a waiting-room and directors' room. On the left side of the hall, behind the front rooms, is the entrance to the telling-room, which measures fully 80ft. in length by nearly 50ft. wide.

**PLYMOUTH.**—Most of the carved panels by Mr. Boulton, at the new Plymouth Townhall, are now completed. Six of the panels, three on each side, represent the arts and sciences. Thus, on the east are Painting, Music, and Sculpture, and on the west, continuing the series, are Architecture, Astronomy, and Mechanics, followed up by Commerce, Plenty, and Law; while the series on the east is followed by Religion, Peace, and War. The subject of the sculpture over the porch of the great hall is "Fame rewarding Industry and Merit." These figures are said to be very well conceived and executed, and to fully maintain Mr. Boulton's reputation.

**WEST BROMWICH.**—The new Market Hall and Public Library at West Bromwich are nearly completed. The style of the Market Hall is Gothic, freely treated, of a slightly Continental character. The hall is 90ft. wide and 151ft. long. The interior is divided into a central avenue, 40ft. wide and 45ft. high, on either side of which are arranged aisles, each 25ft. wide, divided from the central avenue by arcading, supported by iron columns, 18ft. apart, having foliated caps. The Free Library is, like the Market Hall, also of red bricks, relieved with stone and moulded bricks, with columns and foliated caps to entrance and to traceried windows. The buildings have been carried out from the design and under the superintendence of Messrs. Weller and Proud, architects, of Wolverhampton, by Messrs. Trow and Sons, contractors, of Wednesbury; the heating by Messrs. R. L. Jones and Sons, of Monmore Green, Wolverhampton.

### SCHOOLS.

**BERMONDSEY.**—The new board schools at Jamaica Level, Bermondsey, facing the principal entrance to Southwark Park, were opened a few days ago by Sir Charles Reed. The schools, which have been well and substantially built by Mr. Tarrant, of New Kent-road, from plans by Messrs. H. Jarvis and Son, of Trinity-square, Southwark, will accommodate upwards of 1,000 children. The cost of the new buildings, with the land, of which a considerable portion has been laid out in playgrounds, has been over £8,000.

An instance of the great value of City leaseholds occurred on Friday at the Auction Mart, when Messrs. Frank Lewis and Kemp sold for £27,500 the lease of the premises, No. 31, Threadneedle-street, granted by the Merchant Taylors' Company in 1565, for 80 years, at £315 a-year.

### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

### ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 9d. per line.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

### TERMS OF SUBSCRIPTIONS.

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RECEIVED.—J. L.—P. and Co.—S. F. P.—L. and Co.—J. H. W.—F. F.—J. D. W.—R. T. W.—J. B.—W. S.—S. Bros.—H. H.—J. D.—S. D.—T. L. and Co.—S. A.—H. W.—F. G. H. S.—O. H. S.—W. M. and Co.—G. S. F. L. M.

C. W. T. (We do not think there is any such book).—FORD MACKENZIE (We think the Improved Dwellings Competition must be *bona fide*. In all probability all the plans and instructions were absorbed before your application arrived).—TH. B. & W. P. (Yes. Please address the Editor, and not write to any person connected with the paper. Some people like to parade their names. We do not).—A. J. L. (The plan).

## Correspondence.

### ARCHITECTS' ARBITRATIONS.

(To the Editor of the BUILDING NEWS.)

SIR,—I now beg to send you the suggestion for arbitration mentioned in my letter of the 26th ult., and I hope it may draw from your professional readers such an expression of general approval as to induce the Council of the Royal Institute of British Architects to take the matter seriously into consideration.

I do not anticipate its meeting with universal approbation, as the condition that one of the arbitrators must be an architect named by the Council of the Institute would be sure not to suit those members of the profession who are not above acting unfairly and unprofessionally themselves, and in some half-dozen cases of "wrongful dismissal" which have come under my personal observation, architects were certainly actively concerned; and if the whole truth could be known, were probably at the bottom of the schemes.

I hope your correspondents upon this subject will therefore write under their full names and addresses.—I am, Sir, &c.,

E. H. LINGEN BARKER.

Hereford, July 14, 1874.

The suggestion alluded to in the foregoing letter is as follows:—That the Council of the Institute should print and issue memorandums to the following effect for architects to sign and enclose to clients on being engaged for any work.

"The Council of the Royal Institute of British Architects, considering it desirable alike for the profession and the public that all points of dispute regarding technical and professional practice should be decided in as simple, speedy, economical, and just a manner as possible, recommend the following for signature by all parties about to commence building operations.

"We, the undersigned, being about to enter into the relations towards each other of 'Employer' and 'Architect,' agree to refer any difficulty, doubt, or difference of opinion that may arise in respect of our mutual responsibilities to the decision of two out of three independent persons, one to be selected by each of us, and the third by the Council of the Royal Institute of British Architects, power being given to obtain a legal opinion, if required, and all expenses being equally divided and shared between us."

### MR. E. W. GODWIN'S PROGRESS THROUGH MANCHESTER AND LIVERPOOL.

SIR,—The singular mixture of egotism and bad taste the above article displays is only rivalled by the wretched joke at its beginning, and the very questionable sweeping assertion at the end.

Of Mr. Godwin's ability, few who admire the style in which he delights have any doubt; but this ability does not extend to a fair criticism of the works of other men who are at all events as well versed in their profession as he is; and as one who knows Manchester more intimately than from passing through it, I would advise him to spend more than half a day in examining the buildings he attempts to describe before rushing into print, and that seemingly under the influence of a nightmare which drove him from his bed in the early morning to suffer the depressing horrors of Manchester streets.

It would savour far more of intelligent criticism if he were to point out a few of the features to which he objects in the Assize Courts and the new Town Hall, &c., which latter building, by the way, is still surrounded with the hoarding, and therefore cannot fairly be judged as a whole, than to condemn by sweeping assertion. What is there in London so good as these efforts of Mr. Waterhouse?

The (Roman) Catholic church at Stretford, which the architect, Mr. E. W. Pugin, "left to be finished by an auctioneer," as your contributor so delicately and sensibly puts it, may be left to stand or fall on its merits when the name of the architect is written, amongst those who know his work.

About the Free Trade Hall, I think he has been the victim of a practical joke, as in the façade of which he speaks, the over-development of first-floor does not exist.

The Prince's Theatre has certainly not much to recommend it, and was not worth quoting, as it does not aspire to have; but how he comes to condemn so heartily and praise so highly in the same paragraph the work of Mr. Salomons, who designed this, internally as well as externally, and also one of Mr. Godwin's Liverpool abominations, I cannot understand, as certainly no one who has studied this kind of work so much as the architect named would be guilty of anything so vile as the whole of the theatres in Liverpool are said to be.

About the stone of which these buildings are erected, I think all practical men know that there is no better in the kingdom than that from the Halifax quarries of North Dean, Elland Edge, Mount Tabor, &c., and the Huddersfield quarries of Warwick, Ryecroft Edge, and Blackmoor Foot, &c., &c., and that it keeps its colour equal to any used in or out of London.

Moral.—Manchester is at present exercised about a cathedral. Does your contributor think there is no one fit to undertake the job except an architect that he wots of?—I am, Sir, &c.,

FREE LANCE.

### THE HOSPITAL SATURDAY.

SIR,—The idea of a "BUILDING NEWS Hospital Saturday" is a capital one. What Mr. Harry Hems, of Exeter, says about the dangers we are exposed to is very true and to the point. Only to-day in the North-Country town in which I write, a roof of a new building fell in, and five poor chaps were carried fatally injured to the public hospital.

Another building paper this week says that working men ought not to be insulted by being asked to give, excepting through the orthodox collection-box at churches and chapels. I would venture to say, how-



ever, that we would a good deal rather get up a subscription of our own, either in the "yard" or at the "pub," in the way we are accustomed to on special occasions, than go to church to do it.

Personally (and I am not alone by a very long chalk) I don't often attend places of worship, and when I do, I have a kind of suspicion about that "bag" business.

If you were to print a stiff sheet headed "BUILDING NEWS Hospital Saturday," and append a nice little appeal underneath on behalf of the cause, leaving all the rest blank to be filled up with names, and send one of those out with each copy of the BUILDING NEWS on a certain given date, I'll warrant you would have a substantial return. Excuse the liberty I take, and this poor letter; I am more accustomed to hold the mallet than the pen.—I am, Sir, &c.,

C. PICKARD, Stonemason,

96, Victoria-street, Sheffield, July 8th, 1874.

[Whilst thanking our various correspondents who have, from different parts of the country, suggested that there should be "a BUILDING NEWS Hospital Saturday," we think it best for the cause that no paper should be particularly specified in connection with the movement. We go heart and soul with it, and will do our best to give it publicity and strength. At the same time, a thing that is worth doing is worth doing well, and it would be a pity to mar a good work by making it up, even in appearance, with commercial objects. Hence we think it best not to particularly associate it with the BUILDING NEWS.—ED.]

#### SKETCH OF S. GERMAIN'S, CORNWALL.

SIR,—It is to be hoped, if I venture a few remarks with reference to Mr. Gribble's admirable sketch of S. Germain's, Cornwall, published in last Friday's BUILDING NEWS, I shall not be charged with exhibiting a want of good taste, considering the debt we owe Mr. Gribble for thus giving his sketches for the benefit of others. And in passing, I would enter a protest against that inexplicable selfish feeling extant amongst a certain class of architectural students, who, without ever contributing one iota to the common stock of information, even when they are well able to do so, are ever ready to criticise. Of course we are told this is a critical age; it may be so; then surely a species of critical development has reached a premium with architectural students arrived at by no similar class of men. It is characteristic only of narrow and miserably small minds wherever it exists, and one finds it often, even in its most aggravated form, among the leading votaries of architecture.

If architects would keep pace with science, for one thing they must follow the example of scientific men, and adopt their system of mutual improvement. We should then hear less lament about the encroachments of engineers and the absurd notion of diplomas for architects. But to return to Mr. Gribble's sketch. I would suggest that the value of such a sketch, however well drawn, consists in its accuracy. I have just had the opportunity of comparing a very carefully measured drawing of this front of S. Germain's, by one of our leading London architects (whose name I enclose), and the sketch in question, and, notwithstanding all its beauty, the latter is sadly wanting in truthfulness. For instance, the two towers are in reality of the same height, but no one would take them to be so from last Friday's BUILDING NEWS. Again, the peculiar bulging outwards of the porch at its eaves is not shown, while the several points of detail are not just as one would expect. If it be urged that parts are heavily covered with ivy, then why not have shown them so? And is not the second gateway to the right of the picture wholly conjectural? Permit me, in conclusion, to thank Mr. Gribble for his series of sketches, and to congratulate him on his beautiful drawing in the Royal Academy Exhibition.—I am, Sir, &c.,

A THIN WEDGE.

#### MR. J. B. WARING AND SIR DIGBY WYATT.

SIR,—In regard to some remarks in my late "Artistic Records" relating to my connection with Sir M. Digby Wyatt in writing the guide-books to his courts at the Crystal Palace, Sydenham, I wish to state that, after due consideration, I feel, and admit, that I have been entirely wrong in the matter from the very beginning, owing to the exaggerated idea entertained by me as to the value of my assistance, and that my claims, exacting and embarrassing as they must have been, were met by him in a very generous spirit, to which I have long failed to do justice. To him is due the scheme of the guide-books, their arrangement, revision, and some of the most valuable and original portions of each. If I brought the matter, it was he who impressed life into it and gave it form and shape, and without the valuable information he gave me as to works for consultation, I never could have done even what I did. I regret exceedingly that I should ever have taken a different view of the subject, which has made me appear unjust and ungrateful. In making this apology public, you would greatly oblige.—I am, Sir, &c.,

J. B. WARING.

The Burlington Fine Arts Club, 17, Savile-row. W.  
July 15, 1874.

#### A PROTEST.

SIR,—Although an auctioneer and not an architect, I always take a pleasure in looking over the BUILDING NEWS, and have done so from its commencement. It is not often anything can be so misunderstood as a sentence of Mr. Godwin's admirable article in your

impression of July 10, and I feel sure it is not intended as an affront. Will you permit me to point out the mistake made, evidently in ignorance of the fact that auctioneers are men of business, whose training and education generally fit them to occupy positions in the "world of design" to which an ordinary builder's clerk could scarcely lay claim. Many years of my life have been spent in the service of my father, the well-known architect; and this fact, coupled with the fact that, when a "youngster," I won the prizes and certificates at Professor Donaldson's University classes, makes me feel that an injustice has been done the profession I have adopted, and I therefore ask you to correct the idea that an auctioneer has no idea of "consistent" design as well as of "valuation." We have to value all kinds of property before being sold by auction, and of course the "correct design" of a building stands as a matter of considerable value. I therefore very earnestly protest against the idea that the consistently-designed part of a building may be by an "artist architect," and the rest by a builder's clerk or an auctioneer.—I am, Sir, &c.,

JOHN HENRY TARRING

(Of the Firm of Tarring and Harvey).

69, Basinghall-street, E.C., July 13th, 1874.

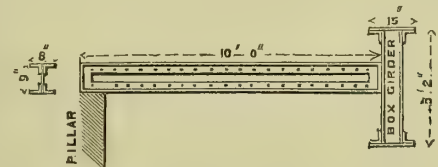
P.S.—What is the meaning of "Artist Architect?"

## Intercommunication.

### QUESTIONS.

[3388].—Architect's Charges.—I have been commissioned to prepare a scheme for laying out an estate near a large town for building purposes. Will any reader kindly inform me how architects usually charge for this kind of work? I do not know what principle to go upon. It is merely to lay out the roads, &c., and indicate the class of house to be built on each portion.—ARCHITECT.

[3389].—Girders.—Will anyone kindly inform me the best method of connecting the cross girder to the box girder as per sketch?—BRIDGE.



[3391].—Adjusting Dumpy Level.—What is the best and quickest method of putting an ordinary "Dumpy Level" into perfect adjustment? I have practised the method advocated by Mr. Gravatt, but fancy the mathematical-instrument makers must have some equally correct, and at the same time less complicated, way of doing it. When living among barbarians it is absolutely necessary to be able to do such things yourself, mathematical-instrument makers not being very plentiful in the Bush.—COLONIST.

[3392].—Mixing Paint.—Under what circumstances is it advisable to mix paint with boiled oil, and when with raw oil? The "Silicate Paint Company" specify raw oil and turpentine for inside, and boiled oil for outside work.—COLONIST.

[3393].—Binding the "Building News."—I am desirous to bind my BUILDING NEWS engravings, as a correspondent recommends in the BUILDING NEWS of January 16th, 1874. I find that the engravings soak up gum and will not adhere to paper, would some of your readers kindly inform me what would be the best thing to stick them together with.—L. O. V.

[3394].—The Construction of Sewers.—I should deem it a favour if some of your readers who are possessed of a practical knowledge of this subject would kindly advance their opinions as to the accuracy of the following theory:—In the construction of oval brick sewers, it is the practice of some engineers to have four or five courses of brickwork in the invert of the sewer "laid dry," i.e., without either mortar or cement, as the case may be; for, according to their theory, they afford a better drainage for the subsoil, as any moisture that may be in the ground will find its way to, and percolate through, the joints of the brickwork. Thus, by this mode of constructing sewers, it is not only held that it affords a mere passage for the sewerage and a drainage of the subsoil, but also that, by the percolation of the moisture in the ground into the sewer, any mud that may accumulate in the sewer is kept in a soft state, and is easily removed by means of flushing; thus being almost self-cleaning. On the other hand, it is advocated by others, under similar circumstances, that the invert, if not the whole of the inner ring of the sewer, should be set in Portland cement, and the outer ring in the best of mortar, so as to render the whole perfectly water-tight. The one method seems to be a direct contradiction of the other, and when both are adopted under similar circumstances, I think that one of them must be based upon some most erroneous notion.—A. T. ALLEY.

[3395].—Measurement of Stone.—I have before me two or three works relative to the admeasurement of stonework according to the practice in London. 1st. Cube stone is taken with the labour of hoisting, and sometimes a charge for sawing. 2nd. If charge for

sawing not included in the cube, it is measured separately. 3rd. If a sawn face is used as a bed, it is again measured as half-sawing. It seems to me that if plain, sunk, and moulded work is taken as if executed on the natural face of a stone, and priced accordingly, then the sawing, when it happens to be done on that face, should not be taken into account, as it saves labour in the before-mentioned work; neither should it be measured more than once when taken as a bed or back of a stone. A clear exposition of the above would be useful, as it is becoming more general than it was formerly to cut up blocks for country work.—A PROVINCIAL.

[3396].—Coats of Arms on Buildings.—Is a "coat of arms" liable to duty when carved on a building as an external architectural enrichment?—LEEDS.

[3397].—Improvement in Window Sashes.—Can any of your numerous readers inform me of any late improvements in the following points? 1. Means of opening sashes without weights; 2. Mode of sliding sashes other than vertically; 3. Fastenings, check rebates, &c. These points have over and over again taxed ingenuity, but no great use has been made of them. Why not?—ENGINEER.

[3398].—Strains.—I am much obliged to R. G. Read for his answer to my query, but would have been glad to have seen some of the working out of the question, either by diagram or calculation.—VI ET VIRTUTE.

[3399].—Pressure on Sluice Valve.—Perhaps some of your readers would kindly answer the following query:—A is a sluice; B is a 27in. valve shut; C is a 9in. valve open; both B and C are under a pressure of water of 550ft. The pipe on which the 9in. valve is fixed branches off immediately in front of the

27in. valve. I wish to know what pressure per square inch is exerted on the valve B, while the valve C is open, and the water constantly flowing through it.—R. L.

### REPLIES.

[3377].—Reservoirs.—Box's formula for the diameter of water pipes, as given by me in the BUILDING NEWS, of June 26th, and Hawkesley's, as given by "Vi Et Virtute" last week, are derived from the same data, and are practically the same.—BETA.

[3386].—Liabilities of Architects.—Both "Nemo," and those who have replied to his question, have forgotten the builder. The committee's contract was with him; if he has failed in it, they can sue him for the extra thickness of lead, and the damage. Fancy him pleading in court, "Although I robbed you of this lead, your architect failed to find me out in time, therefore you must look to him, and not to me!" The architect's certificate is for the purpose of enabling a builder to get his money: it is not a guarantee that every item of the work has been done. Nor is the architect employed or paid as a guarantor. He must use due care and such skill as he can command. If the committee fail to recover from the builder, and can prove want of care on the part of the architect, they may recover their loss from him; but if the architect has been careful, generally, in his surveys, it would be difficult to prove that he had been careless in failing to notice the deficiency of one pound in the lead, when this had escaped the notice of the clerk of works on the spot. We should carefully avoid giving certificates which profess to guarantee the builder's work; but, even if "Nemo" has certified that the work is "completed," or is done to his "satisfaction," and the lead is obviously one pound deficient, that will simply prove, in the first case, that the architect has told a fib; in the second case, that he is easily satisfied. The measurements are not matters for his satisfaction or dissatisfaction, except where he actually measures up work as arbitrator—they are matters of strict contract between the parties. The things left to the architect's "satisfaction" are mainly "qualities" of things, not the "quantities." These last are shown by the drawings and specification, to which the builder is bound to work, and I take it that he may at any time be called upon to make good deficiencies in them.—B.

[3387].—Ventilation.—"T. L. P." is informed that "Warming and Ventilation," in Weale's series (Lockwood and Co.), and Hood's work on the same subject, treat of the warming and ventilation of the Houses of Parliament. Tredgold's treatise also is a good, though old, work on warming and ventilation.—G.

[3388].—Government Contracts.—In reply to "S.," I am of opinion that, unless he can clearly show that the descriptions in the Government quantities supplied were insufficient or misleading, he has no case against the Government. As a rule, no architect or surveyor, however, would admit any responsibility on their part if the quantities supplied were not deficient. Deficiency, and not wrong description of the items, is practically regarded. If "S." put a wrong interpretation upon an item, that would clearly be his look-out; and it would be unfair to call upon the surveyor to make good any loss arising from such misunderstanding after the work was done. But, apart from this, "S." must prove he has been misled or entrapped. Was there no specification or drawings to show mean-



ing? "S." does not mention this. I would advise "S." not to entail further expense, unless he is prepared to show that he was actually entrapped by a false description. Contractors are to blame if they rush headlong into a contract they do not, or will not trouble to, understand.—G.

#### STATUES, MEMORIALS, &c.

**EDINBURGH.**—A monument is about to be erected in the Old Calton Burial Ground, Edinburgh, over the grave of David Allan, the Scottish painter. Mr. John Hutchison, R.S.A., is the sculptor. The monument is a simple monolith of Blany freestone.

**THE EARL OF DERBY.**—On Saturday morning there was a gathering of the members of the party and friends of the late Lord Derby, to witness the unveiling of the statue which has been erected in Parliament-square, Westminster, of his lordship. The statue is the work of Mr. Noble. The figure is draped in an earl's robe. On the pedestal supporting the statue four bronze reliefs are introduced to represent four of the most memorable events of his life, namely, his advocacy in the House of Commons of the abolition of slavery, in 1833, his installation as Chancellor of Oxford in 1853, his attendance as Chairman of the Manchester Relief Committee, in 1865, and his presence as Premier at a Cabinet Council in 1867. These bronze reliefs were designed and supplied by Messrs. Cox and Sons, 9, Southampton-street, Strand. The statue is cast in bronze, and is, including the plinth, about 10ft. high; and the pedestal, which is of the best Peterhead granite, highly polished, is about the same height. Around the capital of the pedestal a bronze wreath of oak leaves and acorns is introduced.

#### WATER SUPPLY AND SANITARY MATTERS.

**FOLKESTONE.**—Dr. Leeman Bowles, of Folkestone, has obtained a verdict, with £1,000 damages, in the Court of Exchequer, in an action for libel which he brought against Mr. R. Hart, the secretary of the Folkestone Waterworks Company. The libels were uttered against Dr. Bowles on account of an unfavourable report he had made upon the water supply of Folkestone, and were contained in letters to a newspaper impugning his veracity.

**TAUNTON.**—The works for connecting the sewerage of North Town with the general system are now rapidly approaching completion, and the sewage of that district, instead of being discharged at Firepool, as in the past, will be intercepted by the new sewer in Grassgrove, and carried to the main sewer in Priory. The siphon which will convey the sewage under the river is constructed of half-inch iron in twelve plates, weighing five tons, and was brought up from the founder's in two lengths, and when riveted together measures 100ft., the measurement of the diameter outside being 2ft. 6in. No system has been adopted by the Local Board for disposing of the sewage when concentrated at the ground they have purchased, but it is probable that the filtration plan of their surveyor, Mr. J. H. Smith, will be followed.

#### LAND AND BUILDING SOCIETIES.

**CONSERVATIVE LAND SOCIETY.**—The eighty-seventh quarterly meeting of members was held on Tuesday. The quarterly report of the Executive Committee congratulated the shareholders upon the satisfactory returns of the cash receipts and issue of shares during the first three-quarters of the twenty-second financial year, which terminates at Michaelmas next. For the quarter ending December 25, 1873, the number of shares in progress had been 157; shares completed, 60; total shares, 217. The receipts for the same period amounted to £39,172. For the quarter ending March 25, 1874; shares in progress, 109; shares completed 64; total shares, 173; the receipts, £25,556. For the quarter ending June 24, 1874: shares 171, shares completed 92, total shares 263; receipts £31,679. For the three quarters: shares in progress 437, shares completed 216, total shares 653; receipts £96,408. Totals to midsummer: shares in progress 31,228, shares completed 7,801, total shares 39,029; receipts £1,959,465. Grand totals to midsummer, 1874: shares in progress 31,665, shares completed 8,017, total shares 39,682; receipts £2,055,874. The total withdrawals under the rules since the formation of the society (1852) to midsummer 1874 were £590,187. The number of the last share issued to midsummer was 39,682. The reserve or surplus fund to midsummer, 1874 (exclusive of office premises and furniture account, &c.) amounted to £9,000.

**LONGTON DISTRICT BENEFIT BUILDING SOCIETY.**—The Secretary has just issued the third annual report and statement of accounts of this society. The sum of £16,711. 5s. 4d. has been received from various sources during the year. The sum of £10,590 has been advanced to members of the society on good mortgage securities, carefully valued and certified by the surveyor. Redemptions to the extent of £2,670 have been effected. There appears to the credit of the society at the Midland Bank the sum of £1,809. 4s. 11d.; still in the presence of numerous applications for advances from shareholders a much larger amount will soon be required. The amount of members' subscriptions, interest, and fines in arrears, is comparatively light, being £289. 19s. 6d. only. After making provision for

every liability, there remains the sum of £10,744. 6s. 4d. in favour of the society, the value of each share being £10. 6s. 4d.

#### LEGAL INTELLIGENCE.

**A BUILDING ON WHEELS.**—At the Wandsworth Police-court on Wednesday week, Henry Perks was summoned by Mr. P'Anson, district surveyor, under the Building Act, with reference to a wooden structure which had been erected on the Shaftesbury Working Men's Estate, Battersea. Mr. Corsellis, in support of the summons, said that on the complainant objecting to the building, four wheels were placed under it, but he submitted that it was still a building within the meaning of the Act. In support of his argument he cited decisions by Mr. Ingham and Mr. Dayman, who was formerly one of the magistrates of the Court, the latter having remarked that in these practical times even S. Paul's might be removed on wheels. Mr. Ingham had recently decided that a wooden fowl-house was a building. Mr. James Hebb, assistant to P'Anson, said the building was in the back garden of an inhabited house on the Shaftesbury Park estate. It was first built on a brick foundation. Mr. Jeune, who defended, submitted that from the character and size of the building the case did not come within the meaning of the Act. There was no precise meaning of what a building was in the section, but it implied that it must be one which had footings. Being on wheels, it was not a building. The character of it was similar to a bathing-machine or dog-kennel, which could be removed. In the first instance it was intended to place a mangle in the building, but that arrangement had been altered, and it was to be used as a wash-house. He was instructed to deny that it was originally placed on a brick foundation. Mr. Hebb said the garden was surrounded by a fence, so that the building could not be removed from it. Mr. Jeune said it was intended to remove it. Mr. Bridge said intending to put a mangle in the building clearly showed it was to be used for habitation. If it was intended to remove it, there could be no harm in making an order. He then ordered the building to be removed in 14 days, and the defendant, to pay £1. 1s costs, in addition to £2. 2s., allowed for an adjournment.

#### Our Office Table.

**LEAD POISONING.**—The Mile-end Old Town Board of Guardians have called the attention of the Local Government Board to the large number of persons constantly under treatment in the district for "lead poisoning," arising from their working in colour and white-lead factories, at the same time observing that the persons under the care of the parish medical officers form but a very small proportion of those who suffer from the effects of lead poisoning so produced, and that the adjoining unions, the London hospitals, the dispensaries, and the medical profession generally, can testify to the large number of cases constantly under treatment. The effects of lead poisoning, resulting, as it does, in paralysis, the entire loss of teeth, and other diseases, are but too well known. As there are several lead and colour factories at the east of London, where men and women are employed, the Mile-end Guardians suggest that the factories should be visited by an official or officials from the Local Government Board, with the view of ascertaining whether machinery could not be substituted for manual labour in the manufacturing departments, and, if this is found practicable, that a clause compelling the use of machinery be inserted in the Factory Bill now before Parliament.

**THE SURVEYOR TO BETHNAL GREEN VESTRY.**—At the last meeting of the Bethnal Green Vestry, a report of a Committee of the whole Board was brought up, recommending that the salary of Mr. Mundy, the surveyor, be raised from £350 to £450 per annum. The adoption of the report having been moved and seconded, an amendment was proposed that the increase be only £50. A member of the vestry expressed the hope that the committee's report would be adopted, for all were agreed as to the ability and efficiency of Mr. Mundy, who had been seven years surveyor to the vestry without an increase of salary. The amounts paid for supervision only, in the surveyor's department, ranged as high as £1,686 in S. Pancras downwards. In Hackney the surveyor's department cost £1,060, of which the surveyor took £650. In Whitechapel the cost was £454; in S. George's-in-the-East, £350; and in Mile-end Old Town, £557. The committee's recommendation was adopted by 19 to 5, and Mr. Mundy thanked the Board.

**ACCIDENTS DURING THE LATE THUNDER-STORM.**—During the very severe storm in London on Saturday last, S. Luke's Church, Hackney,

was struck by the lightning. The church is a very high building, with a sloping roof. It has an unusually long painted window, which was struck in the first instance, and the top portion injured. The action of lightning is not perceptible at the lower portion, but the stone sill—perhaps a foot and a half thick—has a large piece forced out of it as cleanly as if bored with an auger. The electric fluid is supposed to have passed over the entire roof of the church, instantly setting fire to the rafters beneath. The fire was subdued, but not until serious damage had been sustained. The General Post Office, S. Martin's le Grand, was struck, and a portion of the balustrade carried away.

**THE MUNICH GALLERY.**—In compliance with an invitation from the Director, a number of the students of the South Kensington Museum were received at this Gallery by Dr. G. Zerffi, F.R.H.S., the lecturer on art history at the National Art Training School, who pointed out the merits of the different pictures exhibited, and especially mentioning Kaulbach's cartoons, Cosrader's great historical painting, "The Death of Joseph II., Emperor of Austria," Otto's "Triumphal Procession of Bacchus," Kirchner's "Florence," Gugel's "The Gift"; the large collection of porcelain paintings, in which the artists of Munich begin to rival those of Dresden, and the many spirited casts by Schwanthaler. The courtesy of the Director is the more to be appreciated, as it is unfortunately not usual to afford students an opportunity of studying these exhibitions. It is to be hoped that others may follow his example.

**GOVERNMENT INSPECTION OF STONE QUARRIES.**—A few weeks since Mr. Lionel Brough, inspector of mines, made a tour amongst the underground Bath stone quarries at Box, Combe Down, Farleigh Down, Bradford, Corsham, and Limpley Stoke, with a view of including them for Government inspection under the new Mines Act. A schedule of the quarries has been completed, and Mr. Brough has supplied to each quarrymaster a list of instructions. One of the most important of these prevents boys under 13 years of age labouring in underground quarries. The quarryowners in the districts affected have just discharged the boys employed on their works. Upwards of 200 have been thus discharged, causing some inconvenience to the gangers, or sub-contractors, who are responsible for the actual work.

**ROYAL INSTITUTE OF BRITISH ARCHITECTS.**—The annual *conversazione* of this Institute was held on Wednesday week in Conduit-street, and was numerously attended, more than 500 ladies and gentlemen being present. The members of the Society and their guests began to arrive at 9 o'clock, and were received by the President, Sir Gilbert Scott, R.A., and the Council of the Institute. The rooms were tastefully decorated with flowers, and filled with pictures, ancient and modern china, Oriental bronzes, artistic furniture and textile fabrics, statuettes, ecclesiastical metal work, and embroidery. With this entertainment the general meetings of the Institute terminate for the present session, though the Council and Committees will occasionally meet for the transaction of official business until the autumnal recess.

**STOKE NEWINGTON GREEN.**—Ever since the year 1869 there have been negotiations going on between the Islington Vestry, the Metropolitan Board of Works, and the lord of Highbury Manor, with respect to a proposition to secure Stoke Newington Green for the use and recreation of the public. At the last meeting of the Vestry the Clerk stated that he had received a letter from the solicitor to the lord of the manor consenting to sell to the vestry his rights in and over Stoke Newington-green for the sum of £150, with interest at the rate of 5 per cent. per annum on such sum of £150 from the 1st July, the vestry paying the costs in connection with the title and conveyance. The offer was accepted, and the Metropolitan Board of Works is to be asked to contribute a moiety of the purchase-money.

**NEW MINT BUILDING SITE BILL.**—This Bill, though short, contains nineteen clauses. The object is to acquire certain lands situate in the precinct of Whitefriars and the parish of S. Bride, it being "expedient for the public service that the Royal Mint, situate in the parish of S. Botolph, Middlesex, should be removed to a more convenient site." It is provided, by the tenth



clause, that all lands purchased for the purpose, which were at the time subject to land tax, or to poor or other rates, shall continue liable thereto, at the rate at which they stood assessed in January last. The only other clauses worthy of notice are the fourteenth, which states that all buildings proposed to be erected shall be exempt from the first part of the Metropolitan Buildings Act, 1855; the fifteenth, which states that it shall be lawful to erect buildings on any part of the prescribed lands on or under which the works of the Metropolitan District Railway are now constructed; and the sixteenth, which provides that no operations injurious to health shall be carried on.

**THE DECORATION OF S. PAUL'S CATHEDRAL.**—The following letter has been issued:—"Sir,—I am authorised to inform you that a full meeting of the Executive Committee was held on Friday, July 3rd, at the Chapter House, at which almost every member of that body, including all of those who signed the protest lately published, was present. At this meeting the Dean informed the Committee that a meeting of the Chapter for the purpose of considering Mr. Burges' designs had been recently held; and that the Chapter, while accepting Mr. Burges' designs for the Apse alone, and subject to possible modification, had requested the Executive Committee to delay the carrying out of those designs until after its next meeting. The Executive Committee consequently passed a resolution in conformity with this request. The next meeting of the Chapter will not take place until the autumn, and ample time is therefore given for the full consideration of Mr. Burges' designs.—(Signed) W. C. Shone, Secretary. Chapter House, S. Paul's, July 10, 1874."

## CHIPS.

A Cottage Hospital is to be built at High Wycombe, providing for 8 beds with medical and nursing staff &c. This good cause has been warmly espoused locally. Lord Carington, the largest landowner of the district, has given a capital site; the subscription list already amounts to £700 or £800. Mr. Arthur Vernon is the architect.

The Queen's Prize at Wimbledon has been won by Mr. Atkinson, a builder and contractor residing at Stockton-on-Tees.

A new Wesleyan Chapel was opened on Sunday, at Coatbridge, N.B. It will seat 500 persons.

Mr. Grant, the distiller, of Maidstone, having built in 1870 an extensive arched bonded vault entirely of concrete, is now erecting with the same material a large warehouse of three stories above the basement for the manufacture and storage of morella cherry brandy. The building will be 80ft. long and 43ft. wide, and the walls, floors, and roof, are to be of concrete, resting upon rolled iron girders.

The great bridge across the Mississippi at St. Louis, costing 9,000,000 dollars, was opened on Saturday week.

The Home Secretary has approved of a site at Fortune green, Hampstead, selected by the Local Burial Board, for a new cemetery.

It is stated that an extensive pile of buildings is about to be erected in the Temple, overlooking the Thames Embankment. The buildings will belong partly to the Middle Temple and partly to the Inner Temple. Mr. St. Aubyn will be the architect for the Benchers of the Middle Temple, and Mr. E. M. Barry for the Inner Temple.

A new Wesleyan Chapel was opened at Bolton, near Bradford, on Wednesday week. It is in the Italian style, and has been constructed from the designs of Messrs. T. H. and F. Healey, architects, Bradford, with schools underneath. The cost, inclusive of land, has been about £2,300.

In our notice of the Leicester-square improvement, on p. 2, we omitted to mention that the marble fountain, with the exception of the centre, was contracted for and carried out by Messrs. Yates, Haywood, and Co., of 95, Upper Thames-street, in eleven weeks.

The foundation-stone of a New Wesleyan chapel was laid at Formby, near Liverpool, last week. The edifice is estimated to cost about £420; the style will be Gothic, and the building of gray brick, with red sandstone dressings. The architects are Messrs. Parslow and Clark, North John-street, Liverpool; and the builders, Messrs. Costain and Kneen, of Waterloo.

A new church has been consecrated at Bestwood Park, Notts. A marble medallion portrait of the late Duchess of S. Albans, executed by the Marchioness of Lorne, has been placed in the church.

Messrs. Henderson and Glass, of Liverpool, have just issued a new sheet of full-sized end sections of rolled iron girders and joists supplied by them, with the weight per foot marked. The sheet contains every form of joist used by builders, and the weight marked can, if necessary, be increased to suit special requirements.

A marble replica of Woolner's remarkably fine bust of the late Professor Sedgwick has just been placed in the hall of the Geological Museum in Jermyn-street, the gift of a lady who wishes to be anonymous.

S. Luke's schools, Southampton, have been altered and improved during the holidays, at a cost of over £100, under the direction of Mr. Sanders.

The parish-church of Earl Stonham is to be restored, at a cost of £2,000. It is proposed to put a new roof on to the chancel and transepts to correspond as nearly as possible with that in the nave, which is of carved chestnut, belonging to the middle of the fifteenth century. The church will be re-benched with carved oak benches similar to the old ones in the chancel.

A deputation waited on Monday upon the First Commissioner of Works, urging upon his Lordship that steps be taken for the widening of the Kensington-road at the Knightsbridge end.

The new branch of the Great Western Railway, from Dauntsey to Malmesbury, was commenced on Wednesday week. It will be completed in about 18 months, at a cost of £60,000.

A new Baptist chapel is about to be erected at Longton, Staffordshire, in the Italian Gothic style, at a cost of £2,500, to accommodate 600 persons.

The foundation-stone of a New Wesleyan chapel was laid at Easton, on Tuesday week. The chapel, which has an interior area of 28ft. 6in. by 46ft. 9in., is built of local stone in rubble with dressings of Casterton stone. The contractors are Messrs. Perkins and Sons, of Easton, and the architect is Mr. J. B. Corby, of Stamford. The work will cost £530.

The Metropolitan Buildings and Improvement Bill is to be reported against by the Select Committee of the House of Commons, to which it was referred for consideration. The chairman stated on Tuesday that a special report would be made to the effect that the Metropolitan Board of Works had not complied with the instructions of the committee as to the way in which the bill should be framed.

The foundation stone of the new Holy Trinity Industrial Schools was laid at Liverpool on Friday. The building will be 45ft. long by 20ft. deep, and will cost £3,100. Messrs. Rhind and Burrow are the architects.

On Wednesday week the foundation stone of a new church dedicated to S. Andrew, was laid at East Heslerton, Yorks. Mr. G. E. Street is the architect, and Mr. William Creed, the builder.

The employees of Messrs. Farrow and Jackson, Great Tower-Street, celebrated their thirteenth annual bean-feast at Dover, on Saturday week.

Messrs. E. and H. Lumley, auctioneers, last week sold, at the Mart, the Gwemy-goe estate, in the county of Montgomery, to Mr. David Davies, M. P., for the sum of £72,000.

On Saturday evening the parish church of Ayot S. Peter, Welwyn, was struck by the lightning about a quarter past six, and in the course of an hour was completely destroyed, nothing of importance being preserved but the parish registers and papers. The church was built twelve years ago.

At the last meeting of the London School Board, the Works Committee was authorised to take necessary steps at once for completing the fitting up and furnishing of the new offices of the Board, now being erected on the Thames Embankment (behind the Temple Station) from the designs of Mr Bodley.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes:

IRON LININGS, SHELTING, AND OTHER FITTINGS

Of the best Manufacture.

CHUBB'S PATENT LOCKS,

CHUBB and SON,

Makers to the Bank of England,  
57, S. Paul's Church-yard, E.C. } London.  
And 68, S. James' street, S.W. [ADVT.]

## Trade News.

## WAGES MOVEMENT.

JARROW.—The joiners at Jarrow-on-Tyne have given notice for an increase of wages to 35s. 3d. per week of 50 hours.

LEICESTER.—The Leicester Working Stonemasons'

Society on Tuesday struck work for an advance of 2s. and arrangements for overtime.

LLANBERIS.—The exodus of the locked-out Unionists continues, and very few of the Dinorwic quarrymen are to be met with in or near Llanberis, most of them having left for the Nantlle and Festiniog slate quarries. They have, so far, experienced not the slightest difficulty in obtaining work, and avoid a determination not to return to Mr. Assheton-Smith's employ upon the condition dictated by that gentleman—that they must sever all connection with the North Wales Quarrymen's Union. Up to the present time the example set by Mr. Assheton-Smith has not been followed by any other quarry proprietor; nor, so far as can be ascertained, have they endorsed his action by refusing to take on men who have been locked out from his quarries.

MARGATE.—The bricklayers and bricklayers' labourers employed by two or three of the largest firms have struck for an increase of wages; the former demanding an increase of 10d., and the latter of 9d., per day, and to cease work at 1 o'clock on Saturdays.

PRESTON.—A meeting by deputation between the masters and workmen was held at Preston on Thursday week, and it was decided to bring the strike to a close by an agreement to advance the joiners' wages to 32s. per week, the workmen's deputation undertaking, on behalf of their society, to work along with the non-Union men.

S. HELENS.—The joiners of S. Helens, to the number of 150, have gone out on strike, through a dispute with the employers arising out of some rules framed by the Master Builders' Association. One of the rules has reference to the number of apprentices which each master shall employ, and the number fixed by the men has been found inadmissible. There is also a dispute as to the country allowances, on which neither side has been able to agree.

SHREWSBURY.—The joiners and carpenters of Shrewsbury have struck. By a notice given three months ago, they demanded this month an increase of 3s. in wages, and a shortening of time by one hour on Saturday, and with this the masters decline to comply.

## The Timber Trade.

GREENOCK.—An unusually large quantity of timber is shortly expected to arrive in Greenock from Quebec. The timber traders at Greenock are agitating for extra floating accommodation, and a suggestion has been made that the large expanse of water opposite Greenock harbour, known as "The Bank," should be adapted by the authorities as a water enclosure for floating timber.

Wholesale prices of timber and deals, &c. :—

		Per 120 12ft. 1½ by 11.	£ s.	£ s.
Petersburg 1st yellow	3 by 9	16 5	16	10
" "	3 by 7	15 0		
" "	2½ by 7	15 0		15 10
" 2nd "	3 by 9	14 10		
" 1st white	3 by 11	13 15		
" "	3 by 9	13 10		
" 2nd "	3 by 11	12 0		
" "	3 by 9	11 10		
Gefle 1st & 2nd yellow	3 by 9	16 10		
" "	2 by 9	16 0		
" "	4 by 11	16 0		
" "	2½ by 7	15 0		
" 3rd "	4 by 9	15 0		
" "	2½ by 7	14 0		14 10
" "	3 by 9	15 10		
" "	4 by 8	15 0		
" "	3 by 7	14 10		
" Common yellow	2 by 9	14 5		
" "	4 by 12	14 0		
" "	2 by 7	14 0		
" "	3 by 9	14 10		
" "	3 by 11	14 10		
" "	2½ by 7	13 10		
" 1st & 2nd white	3 by 9	13 0		
" "	2½ by 7	11 15		12 0
" Common "	3 by 9	10 10		
Swartwick 1 & 2 yellow	4 by 9	15 6		
" 3rd "	4 by 9	15 0		
" "	2½ by 9	15 0		
" Common "	3 by 9	13 10		
Husum 1st & 2nd yellow	2 by 9	16 0		
Holmsund "	3 by 9	16 10		
" 3rd yellow	3 by 9	15 10		
" "	3 by 7	14 10		
Ljusne 1st yellow	3 by 9	16 0		
" 1st & 2nd yellow	3 by 8	14 10		
Hudikswall 1st yellow	2½ by 10	16 0		
" 2nd "	4 by 11	15 0		15 10
" "	2½ by 10	15 5		
Sandarne 1st & 2nd yel.	3 by 9	16 0		
" 3rd "	3 by 9	15 0		15 5
" "	3 by 8	14 10		
" Common "	3 by 9	14 5		14 10
" "	3 by 8	13 10		
Gothenburg 1st yellow	2 by 5	11 10		
" 2nd "	2½ by 6½	12 0		
" "	2 by 6	11 0		
" 3rd "	2½ by 6½	11 0		
" "	3 by 7	13 10		
" "	2½ by 7	13 0		
" 1st white	2 by 6	11 10		



Gothenburg 2nd white	2	by	6	s. d.	s. d.
" 3rd "	2½	by	6½	10	0
Onega 2nd white	3	by	11	12	5
Drontheim 1st white	3	by	10	11	0
" 2nd white	3	by	9	11	5
Quebec 1st bright	3	by	9	11	0
" 2nd "	3	by	14	16	0
" 3rd "	3	by	11	16	0
" 1st dry floated	3	by	11	13	0
" 2nd "	3	by	11	13	0

Per 120 12ft. 2½ by 6½.

Dram 1st yellow	2½	by	6½	11	10
" 2nd "	2½	by	6½	11	0
" 3rd "	2½	by	6½	11	10
" 1st and 2nd white	2½	by	6½	11	0
" 3rd "	3	by	6½	10	0

Per 120 12ft. 3 by 9.

St. John's unsorted spruce	3	by	7	11	18
Quebec 1st "	3	by	7	17	0
Miramichi unsorted	3	by	7	17	0

Flooring per square.

Gothenburg 2nd yellow	1	by	7	14	0
" 1st "	1	by	6	13	3
Dram 1st "	1	by	6	12	0
" 2nd "	1	by	5½	16	0
" 3rd "	1	by	5½	13	0
" 1st white	1	by	6½	13	9
" 2nd "	1	by	6½	12	6
Fredrickstadt 1st "	1	by	5	18	0
" 2nd "	1	by	6	15	0
" 1st white	1	by	5½	13	0
" 2nd "	1	by	6	12	9
" 1st white	1	by	6	12	9
" 2nd "	1	by	6	12	9
Fredrickshald 1st "	1	by	5	10	0
" 2nd "	1	by	7	13	0

Per fathom of 216 cubic feet.

Riga lathwood	9	10	15
Petersburg do.	10	0	15

Per foot super.

Honduras mahogany	5	5½
Mexican "	5	5½
Cuba "	7½	10
Tabasco "	6	6½
S. Domingo "	7½	10
" curls	12	24

Per load of 50 cubic feet.

Teak	240	0
Quebec red pine	100	0
" yellow	105	0
Dram balks	45	0
Pitch pine	75	0

Staves per mille.

Memel crown pipe	270	0
" brack "	250	0

Per 40ft. 3in.

Dantzic crown deck	25	0
" crown brack	16	0

## WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay.—For samples and further particulars, apply to the MANAGER, at the Quarries Narberth-road, R.S.O.—[ADVT.]

## TENDERS.

BETHNAL GREEN.—For the execution of certain brickwork at the workhouse for the Board of Guardians. Blackmore and Morley (accepted) .... £38 0 0

CITY.—For repairs, painting, &c., Guildhall, for the Honourable Corporation of the City of London. Mr. Horace Jones, architect.

Hanson and Sons	£1,942	0	0
Mansfield and Sons	1,320	0	0
Macintosh	1,318	0	0
Taylor	1,259	0	0
Bracher and Sons	1,038	0	0
Philips and Bisler	1,025	0	0
Pitman and Cuthbertson (accepted)	989	0	0

CITY.—For repairs, painting, and decoration at the London Institution, Finsbury-circus. Mr. E. N. Clifton, architect.

Collman	£1,320	0	0
Battam and Co.	993	0	0
Moxon	1,087	0	0
Phillips	876	0	0
Pitman and Cuthbertson (accepted)	749	0	0

CITY.—For bookcases for the Congregational Memorial Hall Library, Farringdon-street, E.C. Messrs. J. Taring and Son, architects, 69, Basinghall-street, E.C.

Filmer and Son	£219	2	0
Collinson and Lock	680	0	0
George	613	0	0
Jackson and Shaw (accepted)	510	0	0

HACKNEY.—For the erection of additional departments providing accommodation for 377 boys and girls, at the Pritchard's-road, Hackney, School, for the London School Board.

Williams	£4,300	0	0
Williams and Son	4,276	0	0
Clarke and Bracey	3,935	0	0
High	3,894	0	0
Staines and Son	3,874	0	0
Pritchard	3,745	0	0
Sheffield	3,735	0	0
Ennor	3,694	0	0
Niblett and Son (accepted)	3,600	0	0

Cost of building per head, £9. 5s. 8d.

HOUNSLOW.—For new girls' school and classroom, and two teachers' residences, at the Hounslow Subscription Schools. Messrs. Tress and Innes, architects.

Schools.	Teachers' residences.	Total.
Gorringe	£1,440	£1,015
Bray	1,121	1,093
Richards	1,139	906
Reavell	1,067	893
Nias	1,019	929
Wiles	1,067	877
Taylor	980	900
Hiscock	1,010	833
Bruuden	953	824
Simpson and Baker	997	764
Scal	927	791

LONDON.—For rebuilding No. 51, Great Titchfield-street, Marylebone, for Mr. G. Flower. Messrs. Ebbetts and Cobb, architects. Quantities supplied.

Longmire and Burge	£1,390	0	0
Nightingale	1,371	0	0
Macey	1,230	0	0
Atchison and Walker	1,145	0	0
Perkins	1,005	0	0
Hyde (too late)	950	0	0

\* Accepted with some alterations and additions for £1,087.

LONDON.—For alterations and repairs, No. 20, City-road, for the Committee of the Spanish and Portuguese Synagogue. Messrs. Davis and Emanuel, architects.

Heaps	£381	0	0
Williams	338	0	0
King and Son (accepted)	329	0	0

OXFORD.—For Church of S. Aloysius, Oxford. Messrs. Hanson and Son, architects. Quantities supplied.

Waldram and Co.	£4,835	0	0
Farmer and Brindley	6,750	0	0
Wright and Goodchild	6,590	0	0
Farnell and Sons	6,500	0	0
Dover	6,430	0	0
Jones	6,180	0	0
Claridge	5,810	0	0

PETERBORO'.—For a bank for the Stamford and Spalding Banking Co. Mr. Wm. Eve, architect. Quantities supplied.

East	£4,800	0	0
Sheffield	4,277	0	0
Waldram and Co.	4,157	0	0
Foster	4,130	0	0
Nightingale	3,993	0	0

POCKLINGTON.—For new residence for Dr. Wilkinson, at Rowland Hill. Mr. Wm. Lewis, architect, Stonegate, York.

Grant (accepted)	£1,217	10	0
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SWINDON.—For the erection of stabling and extension of running shed at the V. W. H. horse repository. Mr. W. H. Read, architect.

Wiltshire (accepted)	£600	0	0
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YORKS.—Accepted tenders for new stables and additions to mansion, for Colonel Herbert, Upper Helmsley Hall. Mr. Wm. Lewis, architect, Stonegate, York.

Schofield (Joiner)	£624	0	0
Walker (Bricklayer)	483	10	0
Cashill Slater	112	15	0
Cook (for clock, &c.)	61	10	0
Walker (Stable-fittings)	119	3	0
Milburn (Carver)	12	10	0
Weatherley and Rymer (Masons)	112	0	0
Wm. Hartley (Plumber and engineer)	336	18	0
Rauling (Plasterer)	106	0	0
Wilkinson (Concrete)	80	19	8
T. G. Hartley (Painter)	66	2	0
Farnley Iron Co. (Sanitary pipes)	40	0	0
Bolland (Zinc work)	12	0	0

£2,167 7 8

YORKS.—For stone entrance to Manor House and New Home Farm, for the Honourable Egmont Lascelles, Middlethorpe Manor. Mr. Wm. Lewis, architect, Stonegate, York.

Bellerly and Keswick (accepted)	£435	0	0
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YORKS.—Accepted tenders for stone covered way and porch, and new wing, for Captain Hall, Acomb Hall. Mr. Wm. Lewis, architect, Stonegate, York.

Weatherley and Rymer (New wing, &c.)	£374	0	0
Harrison and Hedden (Covered way, &c.)	85	0	0
	£459	0	0

YORK.—For additions, &c., to grain warehouses for Mr. J. Bellwood. Mr. Wm. Lewis, architect, Stonegate, York.

\* Whole Tenders.

Keswick	£499	16	0
Weatherley and Rymer	434	0	0
Gray	440	0	0

Single Tenders.

Sparkling (Brick, plaster, and stone)	237	4	10
Gray (Joiner)	68	10	0
Dickenson (Plumber)	29	0	0
Lee (Painter)	30	0	0
Corbitt (Slater)	3	15	0

Accepted £368 9 10

Name of Contractor	Contract 1	Contract 2	Contract 3	Contract 4	Contract 5	Total amount of contract.	Remarks.
Kent	£3,635 12 3	£3,803 10 9	£14,347 16 4	£19,473 6 2	£17,225 5 6	£78,483 19 8	Schedules not correctly amended.
Luckin	15,091 11 8	8,808 4 10	10,834 4 8	16,698 19 8	51,333 0 10	107,251 12 4	Schedules not correctly amended.
Crookett	13,051 8 2	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.
Dover	13,181 8 2	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.
Ac ek	12,693 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules not correctly amended.
Jas. Neave & Son	13,900 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.
John Neave & Son	13,154 5 6	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.
Young	11,601 1 9	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules not correctly amended.
Harris	14,823 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.
Symonds	14,823 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules not correctly amended.
Potter	14,823 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.
Rigby	14,823 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules not correctly amended.
Jackson	14,823 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.
Vickers	14,823 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.
Baker	14,823 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.
Tilley	14,823 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.
Dickenson	14,823 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.
Jas. Neave & Son	14,823 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.
Potter	14,823 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.
John Neave & Son	14,823 0 0	8,916 10 0	10,972 12 4	15,781 6 4	46,067 9 11	107,251 12 4	Schedules amended.

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## THE BUILDING NEWS.

LONDON, FRIDAY, JULY 24, 1874.

## LONDON MASONRY.

## III.—SANDSTONES.

**S**ANDSTONES, as their name implies, are those minerals which are composed chiefly of particles of sand or silica, cemented into one homogeneous mass; they vary in the size of the silicious particles as well as in the quality and composition of the cementing material, which in some stones is silicious, in others calcareous, and in others argillaceous, or mixed with clay; and it is on the character of the cement that the durability and strength of the stone chiefly depends, as the silicious particles themselves are not acted on by weather, but are separated from each other very readily if the cement is bad, and the stone then crumbles into powder. Sandstones of some kind or other are to be found in all parts of the kingdom, many of them being excellent building stones, and capable of withstanding the action of weather and smoke for a long period, whilst others make very bad building materials, and can only be used for rubble work or the inside of walls. As these stones contain so large a proportion of silica, which is one of the hardest substances in the mineral kingdom, they are generally more expensive to work than the limestones, as the tools have their edges turned more readily, and require to be resharpened very frequently. Much more, however, is made of this hardness by London masons than need be, for if they were worked by those who were accustomed to them, even the very hardest would cost very little more in labour than some of the Oolite stones, such as Portland or Painswick; it is too much the custom in London to put the same masons to work hard sandstones as well as soft limestones, and consequently the cost of working the former is much greater than if worked by a man who had never been employed on any other stone. Nearly all the sandstones contain a certain amount of iron, which gives them their varieties of tints, from a light grey or white to a strong brick red, according to the proportion of iron which pervades them.

The sandstone which is found nearest to London is that of the Calverley Quarries, near Tunbridge Wells, which consists of fine silicious grains with slightly calcareous cement; there are three beds of this stone, the upper bed, which is the softest, being about two feet thick, the middle one three feet, and the bottom bed about one foot; the cost of working is about one-third less than that of Portland stone, or equal to that of the hardest Bath stone. It is not a heavy stone, weighing only 118lb. to the cubic foot, and the colour is a variegated brown; it belongs geologically to the Hastings sand, or Lower Cretaceous series, and has been occasionally used in London, but from its soft and friable nature, is hardly suited to the climate, as the cement is not of a durable character.

The sandstones best known in London are those designated by the term "York," owing to their being chiefly obtained from the West Riding of Yorkshire. This term is, however, applied more especially to "flags" for paving, landings, cills, and steps, for which purpose a highly stratified or flaky stone is employed, and always laid on its natural bed; and when used in this manner they do not suffer from frost, although they absorb and give off moisture very readily. But if placed with their bed vertical, they draw up moisture from the ground, and rapidly fall to pieces by flaking off in thin layers. The crushing strength of Yorkshire flagstone is between 5,000lb. and 6,000lb. per square inch, and its

weight 145lb. to the cubic foot. What are termed "self-faced" flags are taken from the upper part of the quarry, and are not so strong or durable as those of the lower beds, which are sent to London as "quarry-worked," or "tooled" stone; "rubbed" steps are generally got out of a softer material, and, therefore, not so durable. Besides the "flags," however, there is a large quantity of excellent building stone quarried in various parts of Yorkshire, the prejudice against its hardness and cost of working being the chief reason why it is not more often used for first-class buildings in London. This material belongs geologically to the rocks of the "Carboniferous" series, and to the "Millstone-grit" underlying it, which pervade the western parts of Yorkshire and the adjoining part of Lancashire, the neighbourhoods of Leeds, Huddersfield, Halifax, and Burnley supplying the best quality and largest quantity of building stone. The Yorkshire stones are composed of either fine or coarse-grained quartzose sand and decomposed felspar, cemented with an argillo-silicious material, and having numerous flakes of mica in the planes of stratification; iron, either in the form of oxide or silicate, is generally found in them, giving them their colour, which varies from a greyish-white to a dark reddish-brown.

Bramley-fall stone, which is found near Leeds, is one of the hardest, strongest, and coarsest-grained of Yorkshire stones, having a light ferruginous brown tint; there are six beds of this stone, the thickest of which is sixteen feet, and large blocks can be obtained. The cost of working in London is about one-fourth more than that of the hardest Portland, and the weight of a cubic foot is 142lb. This stone has been employed in some of the public buildings of London, the whole of the entrance portico and lodges to the Euston Station, built in 1838, being composed of it, and portions of the piers of Southwark Bridge; it is an excellent weather stone, but unsuitable from its coarseness for delicate carvings. Park-spring stone is also obtained near Leeds, and is a fine-grained, light brown stone, much easier to work than the Bramley-fall, and better suited for architectural carvings; it is not, however, so good a weather stone, and will rapidly decay if exposed with its bed outwards to the action of weather or acid vapours. The thickest beds do not exceed three feet, and from the closeness of its grain the weight is more than that of the Bramley-fall, being 151lb. to the cubic foot; it does not absorb moisture readily, and has a crushing strength of 7,000lb. per square inch. Much of this stone is used in London for cills, steps, and other parts of buildings subjected to friction, the cost of labour upon it being but little more than that of Portland.

There are many other quarries in the same locality—as that of Stanningley, which supplies a good building stone, well suited for fine work and carvings, but rather harder than the Park-spring stone, although lighter in weight; the thickest bed is six feet.

The moors about Huddersfield and Halifax supply some of the best building stones to be found in the kingdom, but unfortunately, the most durable of them are but little known in London. The greyish-white stone found at Longwood, Scotgatehead, and other places near Huddersfield, is the hardest and most durable, as well as the handsomest building material; the grain is close and fine, and the stratification scarcely perceptible. It stands the smoke and weather well in the numerous buildings where it has been used at Huddersfield, except in cases where it has been placed vertically as ashlar with its bed outwards, when it peels off in flakes like all the other sandstones. It is a heavy stone, weighing 154lb. to 158lb. to the cubic foot, and the thickest beds are 4 to 6 ft.; the cost of working in London is about one-fourth more than that of Portland. There is a warmer-tinted stone, of a softer character, found in the same neigh-

bourhood, which is less durable, but being more easily worked, is largely exported to Manchester and other towns; it will stand very well, however, if great attention is paid to the proper bedding of the stone, a matter which is too little considered even by those who are well acquainted with its character.

We have referred to only a few out of the numerous quarries to be found in Yorkshire and Lancashire, but these may be regarded as types of all the rest; many of the stones are too soft and powdery, whilst others are too coarse and badly coloured to admit of their being introduced into London buildings. It will be necessary, therefore, for the architect to specify the colour and character of the stone he wishes to be employed, as well as the locality from which it is to be obtained. Judging, however, from the appearance of the stone-fronted buildings in the large manufacturing towns, we should be disposed to think that these stones retain the smoke and lose their natural tint much sooner than Portland, the generality of the buildings which have been erected more than twenty years being as black as any that are to be seen in London.

Whilst on the subject of Yorkshire stones we must not omit to notice those which are obtained in the neighbourhood of Whitby, on the north-east coast of Yorkshire; these belong to the Lias formation, and are very different to the "grits" above mentioned, being softer, lighter in weight, and less durable when exposed to weather. The chief quarries are those of Aislaby, Egton, Sneaton, and Newton Dale, the beds varying from 15ft. in thickness at the first-named place to 18 inches at the last. The stone generally consists of silicious grains of moderate size with argillo-silicious cement, plates of mica and spots of carbon being disseminated; the tint varies from light to dark brown, and the weight is 127lb. per cubic foot; the cost of working is little more than that of the hardest Bath stone. The qualities vary considerably in the different quarries, the upper beds of Aislaby having a fine grit, partly white in tint and partly brown, but its lower bed is coarser in grain, and resembles that obtained from the other quarries. Whitby stone has been employed in London in some of the external portions of All Saints' Church, Margaret-street, erected twenty years since; it shows, however, symptoms of decay in several places, and can hardly be recommended to London masons.

The red Mansfield stone found in the county of Nottingham must be classed among sandstones, although only half its composition consists of silica in fine grains, the rest being chiefly the carbonates of lime and magnesia which form the cement to the silicious grains. It has a pleasing roseate hue, and is, in consequence of its tint, largely used in London for the shafts of columns. The beds average about three feet in thickness, blocks of ten tons being obtained. The stone is generally sound and homogeneous, and capable of resisting the action of weather without disintegrating, as well as of retaining its colour for a considerable period in a smoky town. It is a close-grained, non-absorbent stone, weighing 148lb. to the cubic foot, and costs to work about the same as the hardest qualities of Portland. The stratification of this stone is but slight, although sufficient to indicate the natural bed; it belongs geologically to the Magnesian Limestone series of rocks.

The only other class of sandstones which are used to any extent by London masons is that found in the neighbourhood of Edinburgh, with which they will probably become as well acquainted as they are with Portland when the facilities for water carriage are increased. Of these, the Birnie stone consists of fine quartz grains, with argillo-silicious cement, and mica in the planes of the beds. The colour is a brownish-grey, and the weight 140lb. to the cubic foot; the beds vary from fourteen to eighteen feet in thickness, alter-



nating with shale. It is rather absorbent of moisture, and not harder to work than Portland. The Humble stone consists of fine quartz grains, with silicious cement, slightly calcareous, and having mica in the planes of the beds. The upper beds produce a dark brownish stone, the middle beds a white stone, and the bottom beds a greyish stone; the white weighing 140lb. and the grey 136lb. per cubic foot; the thickest bed is eight feet. This stone is worked freely, at about the same cost for labour as Portland.

Of all the stones, however, which are obtained near Edinburgh, that of the Crag-leith quarries ranks highest for hardness, strength, and durability, consisting almost entirely of fine quartz grains, with a silicious cement and occasional plates of mica. The colour is a whitish-grey, the weight of a cubic foot is 146lb., and the crushing strength upwards of 7,000lb. per square inch; it is very hard to work, and consequently is only used in London for purposes where extra durability and strength is required, as for basement or foundation work, or for steps exposed to heavy traffic. In consequence of its density and non-absorbent character, it retains its appearance for a long time, and the atmosphere of London has but little effect upon it. The beds, which are very numerous, vary considerably in thickness from a few inches to ten feet. All these stones belong geologically to the Carboniferous system, and resemble in many respects the "grits" of western Yorkshire. Other sandstones abound in many parts of Scotland, as at Dundee and Arbroath on the eastern coast, which belong to the Red Sandstone or Devonian series, but the distance prevents their being brought to the London market in any great quantities.

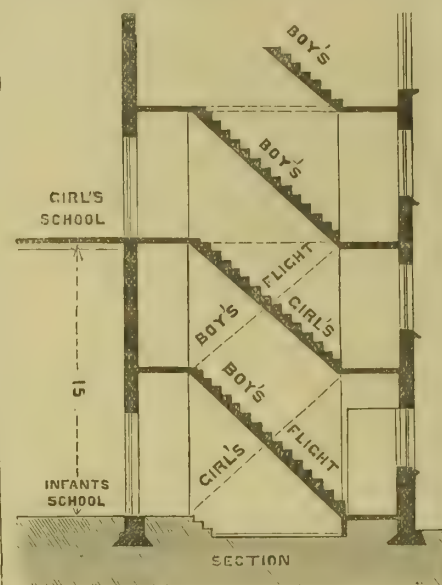
## SCHOOL ARCHITECTURE AND PLANNING.\*

[CONCLUDING NOTICE.]

**R**ESUMING our notice of the details of schools, to which Mr. Robson devotes a considerable chapter of his book: The position of the entrances is important. In larger mixed schools the entrances should be separate; the girls' and infants' should not be too far apart, though completely away from that of the boys', if possible. This, however, will depend upon the site, and whether there are two streets or approaches on different or opposite sides of the schools. A lobby or porch is desirable in every case, first to give a covered place or shelter for children arriving; second, to afford a screen to the schoolroom, and retain the warmth as much as possible. Such a lobby or porch should be external, and the doors should be easily opened and yet of sufficient width. Mr. Robson advises a folding door, one portion about 2ft. 3in. for the use of the children, the other part about 1ft. 4in. being opened only at the dismissal of the school and at other times. We should advise a folding door of equal portions of 2ft. or 2ft. 3in., as it would be easier to frame, and not too large on emergencies. The bottoms of the doors in some neighbourhoods should be lined with sheet-iron. A bell also should be provided to principal entrance, and a letter-box.

Staircases of stone or some fireproof material should be provided, one for every department of the school above the ground-floor. Two separate staircases may be necessary in large establishments, so as to avoid any confusion or dispute among the teachers. Mr. Robson thinks that above the number of 240 a second staircase is necessary; below this number one centrally placed and easy of access from school and classrooms may suffice. We quite agree that school staircases should be of some size and importance, and that ease and safety

should be consulted by making the risers not more than 6in., and avoiding all winders, simply having landings. These should be wide though the stairs may be narrower, or about 3ft. 6in. Handrails should be of hard wood and be placed on each side. Low steps and short flights are safest; hence double flights are generally advisable. One kind of double staircase must be mentioned: the flights cross each other, one being for the girls and the other for the boys; the half-landings thus formed facilitate supervision, and these mezzanine spaces are useful for lavatories, &c. A solid wall divides the two flights, and thus the children are kept perfectly distinct. The accompanying diagram will better explain this



arrangement. In limited sites, as those occupied by the new schools for London, this staircase has been much used. The "following" staircase, in which the flights follow, one being over the other, does not answer so well. Where economy of land is not essential, short flight stairs should be used. Three or four flights may sometimes thus be arranged, and two or three landings obtained. In schools of maximum size, with departments of 240 each, four staircases are necessary, two to each upper floor. The doors on landings of staircases should separately give access to school and classrooms.

Lavatories placed at the side of entrances, or at one end of the cloakroom, are not recommended. A small separate apartment, convenient to the schoolroom, is considered best, as avoiding splashing and untidiness. Lavatory and cloakroom may be combined, and yet the former should be shut off by a glazed screen from the latter, the basins being ranged along the windows. The plan shown in Mr. Robson's work is an oblong apartment, divided partly by a boarded screen along its length, about 7ft. high, with rails and pegs for caps, &c., the end is cut off by a glazed door as the lavatory, and thus the latter is approached through the cloakroom. Two or three basins to each hundred children should suffice, though much difference of opinion exists on this point, for in Germany no lavatories are provided. An infant lavatory should be about 1' 11" from floor and for graded school 2' 2". A good kind of lavatory is shown, in which the basins are fixed; the plugs are not attached to a chain, but are lifted slightly and turned half round to discharge the water; the taps are self-stopping; directly the child's finger is released the iron weight attached to lever of tap falls and turns the water off; an iron drain running along the bottom of basins takes the waste; the floor under lavatory is sloped into a gutter to take away any slops. The basins are of enamelled iron with slate slab tops. The floors of lavatories should be of cement or asphalt. Cloakrooms should have two entrances,

with a wood division for hanging, one door being for entrance and the other for exit. In girls' schools a place for shoes should be provided. A hot-water pipe should pass through the cloakroom. To economise space, the lavatory may be placed on a half landing, or mezzanine. Pegs should be of wrought iron. Latrines, &c., should be enclosed by walls so as not to be seen even with the doors open. Wooden partitions or slate separating the closets under a ventilated roof is best. Iron troughs are preferable. One or two closets should be provided from the staircase landings, and the babies' room should have a closet attached. Three closets to the first hundred, and one for every other fifty, are recommended; teachers and caretakers should have their own. As to playgrounds, they should be compact and free from draughts or eastern aspects; portions should be covered in for wet weather. Playgrounds may be obtained where land is dear by raising the school about 8ft. above the ground, and this has been adopted at Eagle-court (Clerkenwell) schools, and Angler's Gardens, Islington, and also at Winstanley-road schools, which were illustrated in the BUILDING NEWS two weeks since (page 71).

Girls and infants should have their playgrounds adjoining each other; the boys' being isolated by a wall. For paving, asphalt is best, or wooden blocks may be used. A tar pavement can be laid for 2s. 6d. per square yard. A gravel surface is not to be recommended, being costly, dirty, and lending itself to stone-throwing.

As we have hinted in our first article at the best means of lighting, we will here describe the details for opening windows by way of iron rods; simply repeating that a steady light from the back, as north and east, is better than front lighting, and side left-handed lighting best of all. Glare in the eyes of teacher or children is to be avoided at all risks. Windows should be placed high in the walls for ventilation and light; sills about 5ft. or 6ft. from floor would not be too much, and we agree that school windows are often too low. Very often in Gothic schools the heads of windows are blocked up by false arches and herring-bone courses; this is to be avoided in all cases, as the windows should be made to open at the top, and they cannot be too close to the ceiling.

Mr. Robson illustrates a method of opening casements which has some advantages. The opening is divided by an upright mullion or bar and by two transoms, the upper one about one-fifth of height of window from head. One or both of the top lights so cut off may be hinged at their bottom edge to fall inwards. Below the top transom bar, one of the side lights or casements is hinged at the side, and opens inwards, the other three casements remaining fixed. The upper lights are opened by a rod passing up the mullion, and worked by a lever handle below sill; the side lights are opened by similar rods attached to jamb.

Casements opening outwards are better in some respects, are more weather-tight, and admit of internal blinds. Sliding upper sashes also may be used with like advantages. Clear glass is recommended, though in windows next streets, &c., the lower half would be best glazed with thick or opaque glass. The great object in all school windows is upper light and ventilation, and a glimpse of sky is better than the sight of a street. Small panes, on both artistic and economical grounds, are better than large sheets. One superficial foot of glass to 80 cubic feet of space is required. Blinds should be considered. We would suggest one other point, that several moderate sized windows are better than one large one.

Movable partitions is another vexed point. Both sliding partitions and curtains have been found defective. Simplicity, easy moving, and sound-proof quality, are not to be found combined, and Mr. Robson says they should never be adopted, unless absolutely required. There is no question that a double partition, or sliding doors with an enclosed air-space, is

\* "School Architecture: being Practical Remarks on the Planning, Designing, Building, and Furnishing of Schoolhouses." By EDWARD ROBERT ROBSON, F.R.I.B.A. London: John Murray. 1874.



best. Partitions, or framed sliding doors, hung to a metal rail at top, one on each side of the 9in. wall or quarter partition, with friction wheels of about 6in. diameter, are found to answer. Small wicket doors with glass panels in these partitions, may be useful.

On the subject of galleries, we refer our readers to the details we gave last week, and the details we illustrated (p. 252, Vol. XXV.).

The noise in infants' schools has suggested a less resonant flooring, as a paving of wood blocks or cubes, about 4in. each way, set on end and laid on asphalt upon concrete; or a short plank floor, the pieces being 14in. by 3½in. by 2½in., set herring-bone angle fashion is cleaner looking. Upper floors should be pugged. A wainscoting or dado of matchboarding or cement round schoolrooms up to cill line is the best finish for walls.

Chapter XV. is devoted to the subject of warming and ventilation, and contains some useful information, with which, however, our readers may be pretty well acquainted. The gist of our author's remarks points to the necessity and inseparable nature of both functions—namely, warming and ventilation—or a supply of fresh air as well as means of heating being provided, though as a rule one only has been attended to. The numerous forms of ventilating grates, or those having hot air chambers and inlets and direct means of receiving the fresh air, as the "Manchester," Galton, Boyd, and others, are recommended; the London School Board adopting the latter kind largely. Hot-water pipes at high-pressure are not favoured, nor is the low-pressure. Mr. Price's basement apparatus is preferred for large schools. This consists of a series of vessels placed vertically in a chamber and heated by a boiler with flow and return-pipes; the flues from this chamber rise to the rooms and have vertical apertures near floor, the vitiated air is drawn off at ceilings into separate flues, which meet at a chamber in roof artificially heated by a separate boiler in basement; this latter heating-apparatus is not required in summer time. The advantages of this plan are great in large schools, pipes and gearing are out of the way of the schoolroom; fresh air is admitted in basement.

For infants' schools of 120, two fireplaces are most economical, and even for schools of 500 the open fire is to be recommended. For numbers of 750 and upwards the artificial system is acknowledged as more efficient and economical. Floor gratings should be avoided as dust-holes, and inlets should be placed in the walls away from the desks; outlets should be on the opposite side of room to inlets and in ceiling. There is no doubt architects and manufacturers are wanting in information, or in that *esprit de corps*, which is necessary to carry out scientific and effectual systems of warming. In all systems, the test of practical everyday working must be considered as an element. We advise architects to study this subject more. The new schools at Stepney are warmed on the system last described.

A few words as to style. With the commencement of a new era of Elementary Schools has arisen, at least in some of the Board Schools of London, a desire to do something in a different style of building than hitherto practised. Whether that desire is on the whole beneficial we will not at present say; its motive is a good one, though its immediate direction may be open to question. It may probably be that the secularisation of education, or the secular impulse under which the new schools have been erected, may have something to do with a return to a style which was associated with the matured spirit of the reformation or the tone of the eighteenth century. We suggest the inference; it is, however, certain that the prevailing tendency of Gothic does not lend itself to the requirements of school-building under the new régime. The use of bricks in a common-sense and practical manner, the necessities of high lighting and square windows, ceiled roofs, and the avoidance of

all features whose sole aim is the "artistic" or symbolical, have favoured a style of design which, if not really befitting or beautiful, at least adapts itself to plain and modern ideas with some ease. We are told "the only simple brick style available is that of the time of the Jameses, Queen Anne, and early Georges." The buildings of those periods approach nearly the spirit of our times, and "are true in point of construction and workmanlike feeling." As a nucleus of a good modern style they are proposed, though we accept the dictum that they vary much in architectural merit, and that we may "accept their spirit and yet clothe our own rendering with new form and a higher sense of architectural being." The italics are ours. After all, it is sensible treatment we want, and let us take the examples which the new schools of London afford. Harwood-road School, Fulham, by Mr. Champneys, may be taken as a good representative type of the new style. It is a parallelogram, with a projecting classroom on plan; one end is devoted to the entrance, masters' and mistresses' rooms, lavatories, &c., which portion forms a lower wing than the main school. The cost was nearly £6,000; the total accommodation is 727. It is exceptional in being faced with red brick, relieved by projecting vertical piers and window dressings, the upper windows forming dormers, and are roofed back to main roof. Most of the buildings erected for the elementary schools are built of "stock" brick, relieved by red dressings, than which, we are bound to say, nothing looks worse or more tawdry. If red brick is more absorbent, the use of grey or white "stocks," with dressings of a whiter pressed kind of brick, as "Suffolk," is far more pleasing in contrast. The Shore-ditch proposed schools (shown on page 306) exhibit an attempt at combining the separate classroom system of German schools with the English points of merit. The ground floor is occupied by two departments of an infant-school, the first floor is occupied by a central hall with two boys' schoolrooms and classrooms, and the girls' departments over. An old brick treatment of a Georgian era, common in London, is adopted.

Two other good examples we illustrated in the BUILDING NEWS, p. 71, viz., the Winstanley-road School, and that at Haverstock Hill, in both of which a free treatment of a semi-Gothic character is attempted. The castellated treatment of the parapets in the Winstanley School is objectionable, and we decidedly think parapets are one of those peculiarities of the pseudo-Classic best avoided. The schoolhouse in Angler's-gardens, Islington, is considered a model plan. Covered playgrounds occupy the ground floor, above which we have two floors of graded school, with projecting end wings as the classrooms. The points which are gained are:—no corridor space, double entrances, the same number of classrooms as classes in the schoolroom, side lighting, classrooms in pairs, and mezzanine lavatories and cloakrooms. Cost of building was £8,700, and the accommodation of the three departments, 1,090. Mornington-road School, though of good plan, is as repugnant as any grotesque Gothic building; the corbelled pilasters which protrude from the walls over windows, and the heavy termination of chimney-stacks, are not very likely to promote the vaulted new style. The Camden-Town School is a better example, though of a semi-Gothic character, with angle buttresses. A still more Gothic treatment is exhibited in the Mansfield-place School, Kentish-Town, which ranks in plan among the most complete of the Board schools, and the design is characteristic and bold, and may be taken as one of the best modifications of style, with Mr. Roger Smith's at Stepney. The cost of building was £9,600, and the total accommodation 1,129. As regards the average cost of the Board schools which have been erected in London, £7. 10s. per head, and £3. 10s. for site, may be taken, or about £11 per head.

## INTERMITTENT FILTRATION; A SELF-ACTING SEWAGE REGULATOR.

AN inspection of a model exhibited by Mr. Bailey Denton, C.E., of Whitehall-place, at the International Exhibition, has shown us that the difficulties in the way of evenly distributing the sewage over the surface of land (one of the greatest objections to the ordinary system of irrigation and intermittent filtration) can be met, and with great simplicity. Dr. Frankland was the first, we believe, who, in his Report of the Rivers' Pollution Commission, proved by experiments that intermittent downward filtration has certain advantages over the method of continuous upward filtration. The advantages established for the intermittent downward process over the other various modes of filtering sewage were:—1st. The process is an oxidising one; it alternately receives and expires the air as the fluid intermittently percolates the soil. 2nd. The action of the soil, or filtering medium, transforms the organic matter into harmless inorganic salts when the amount of sewage does not exceed a certain proportion of filtering material. 3rd. A continued aeration of the filtering medium is secured by the process.

Mr. Bailey Denton supplemented, and, we may add, perfected the method of intermittent filtration, as thus suggested. He showed the necessity of the complete aeration of the filtering medium, between the successive passages of the sewage, that no clogging or saturation of the soil should exist, but that the under-drainage of the filtering medium should be such as to allow a free discharge of the water arising from excessive moisture. To attain these results it was necessary to control the flow of sewage, so that, instead of discharging in sudden and unequal quantities, the fluid should be apportioned to a given area of drained land; for without such a regulation the cleansing capacity of the soil would be either overdone or underdone, and this evil has been the chief hindrance to the success of irrigation in a commercial point of view. Mr. Denton's new self-acting regulator meets these objections, and enables us to deal with land as we find it, to apply the fertilising liquid with profit and effect, and in fact to give to our land just so much of the liquid and no more, just as the land may be in a drinkable state by proper subsoil drainage, or otherwise prepared to receive it.

Merthyr-Tydvil, in South Wales, has been successfully treated by Mr. Denton in the manner here described, and the results are briefly that ordinary agricultural crops can be grown at the same time as the process is in operation; that the return on expended capital has been much greater than that derived from any surface irrigation; and that no nuisance from unpleasant odour is perceivable. The process has been about three years in operation, and no saturation or deterioration of the absorbing power of the soil has been found.

The Rivers Pollution Commissioners state that an acre of suitable land, drained 6ft. deep (or two cubic yards of filtering material to every square yard of surface) will cleanse the sewage of 3,300 people up to their standard of purity. Mr. Denton has reduced this number for effect to 1,000 persons per acre; and distributes the operation thus: "That instead of one area three equal areas be provided, each capable of cleansing the whole of the sewage, and of growing crops at the same time." "That each area be used for the purification of the sewage for one year only at a time, so that two out of the three areas may be two years in succession devoted to full plant growth." This we think a judicious mode of distribution, and the intervals would increase the productiveness of land. Simplicity is the main feature of this process of filtration.

Let us now describe the "Regulator," which is equally simple in operation, and is adapted alike for country mansions, institutions, villages, and towns. It is simply a



double-chambered tank or receptacle. The first and smallest chamber, called the "intercepting chamber," receives the coarser matters which float with the sewage, being here disengaged or strained off by two strainers or gratings, filled with some porous material. The sewage then reaches the "meter-tank," which is provided with a syphon outlet, and which discharges the liquid directly it reaches the top of the bend. This discharge continues until the level of the liquid in the tank falls to the inlet end of the syphon, when the air being admitted, the discharge discontinues. The tank again fills with a greater or less influx, and as soon as the liquid rises to the given level, the automatic discharge is repeated, and can be applied to the same or another area of land. A sloped bottom to the tank provides for the precipitated deposit of finer particles of the liquid, which can be left as consolidated matter for removal. A double meter tank (self-acting by floats) enables one compartment to be filling while the other is being emptied of its solid matter by a sluice or valve.

These meter-tanks can be multiplied in number according to the quantity of sewage treated, and the use to be made of the precipitate. In many cases, where the amount of sewage deposit is small, it can be flushed out of meter-tank occasionally. The tank is of such capacity that it will hold the exact quantity of liquid required to deliver to a given area of land at once. Scarcely any attention is needed, and we understand no night labour is entailed. Before leaving, it is only necessary that the attendant in charge sets his stops, so as to distribute the liquid to such carriers and furrows as are required.

Thus economy in sewage farming is attained by giving to the crops that quantity of sewage necessary to fruitfulness, while the unequal discharge at the outlet of sewer during the day is regulated automatically, and the syphon delivers it at a gradually decreasing rate—most suitable for irrigation and intermittent supplies.

Messrs. J. Bailey Denton and Rogers Field have fitted their automatic sewage meter at the seat of the late Hedworth D. Barclay, Esq., at Eastwick, near Leatherhead, where it can be seen in operation; but a visit to the model now exhibiting in the western annexe of the International Exhibition, where London sewage of the veritable sort is delivered daily to the regulator, and discharged on to natural soil at the rate of eight gallons of sewage to a cubic yard of drained soil, coming out a clear effluent, should be made by all interested in sanitary science.

The value of the filtration is shown by the following analysis of Dr. Benjamin Paul.

"In 100,000 parts of water—

Free ammonia . . . . . '009

Organic nitrogen . . . . . '049

The figures show that the purification of the sewage has been very complete, and they afford evidence of the satisfactory working of the filter. The effluent water is well within the limits suggested by Dr. Frankland and the Rivers Pollution Commissioners as the standard of purity for effluent waters."

This speaks for itself, and we conclude by saying we think the patentees have solved the difficulty attendant upon irrigation, first by avoiding the depositing and pernicious tank or cesspool; second, by economising labour; third, by simple automatic action involving no risk of nuisance; fourth, by equal and determined discharges of the sewage upon the land without the soddening effects of ordinary distribution, and at the rate of 3,000 persons (supplied with 20 gallons of water per head) to an acre of drained land 5ft. deep. We think the authorities of large towns can now look with some degree of favour upon a plan of profitably turning their sewage to account.

A new church was consecrated on Wednesday at Murston, Kent. Mr. W. Burges is the architect, and Mr. Adcock the builder.

## THE DOME OF S. PAUL'S AS ADORNED BY SIR JAMES THORNHILL.

WE have somewhat perseveringly read many volumes on matters artistic, with all degrees of praise or blame for special artists, but in our remembrance we have not come across a commendation of Sir James Thornhill, the fortunate or unfortunate painter of the interior of the dome of S. Paul's Cathedral. It is a curious circumstance, not a little noteworthy, that it has been the fortune of some artists, like President West, the Painter, to attract a good deal of notice and be quite famous in their own day, for we sometimes know not what, while others fare the very reverse: *neglect*, and ill-luck is all they seem ever to grasp. Sir J. Thornhill was certainly a great man in his own day; he was by Queen Anne made Court Painter, and she it was who employed him to paint the history of S. Paul in the Cathedral which was dedicated to S. Paul. He is called in a contemporary notice of him, "that great master of historical painting." He was a portrait painter as well, and painted, among other things, the Refectory and Saloon in Greenwich Hospital. He was fortunate, too, under the rules of both George the First and Second. He was born in 1676 and died in 1732. He painted, it may be mentioned, the portrait of John Shepperd, the Jack Shepperd of ingenious and ill memory, and very well done it is. A notable man in his own day and generation, it must be a matter of no small interest to find out what his real and genuine merits as an artist and painter were, seeing that the only attempt at the real adornment of S. Paul's, *i.e.*, the *painting* it, was his work. The painting of S. Paul's, and its adornment in its commencement, is indeed a notable fact. What is this beginning worth, then? is an important question at this moment.

In the first place, then (and we beg to remind the Committee of Adornment of the fact), these paintings of Thornhill's round the inside of the dome of S. Paul's—and it is a noteworthy fact—are enclosed in a really fine and most appropriate *architectural* composition; and which was without doubt the work, as far as the design went, of Sir C. Wren himself. It was Wren's part of the painting, or "adornment," of the dome. We note this especially, inasmuch as it has been proposed to do away with this work of Thornhill's, and substitute mosaic decoration of some sort for it. If this should unhappily be determined on, we would urge upon the Committee to retain this special *architectural* part of it, as being indeed and in fact the architectural decoration or adornment of the dome by Wren, the architect of the Cathedral and the worker out of its details. This is a most important subject to consider, and in the very first place; for the painter could hardly have gone to work without this previous work of the architect, thus indicating the whereabouts of the decorative painting, the most appropriate *size* of the pictures, and their subordination to the architecture, and their consequent harmony with it. At all events, we contend that this part of the work should be preserved. It is very finely designed, and worth a something for its own sake, and it should be compared with the work to be found in the model in the rooms of the Royal Academy. We have been but able to study this dome of S. Paul's, and its painted architecture and paintings, at some considerable disadvantage. It needs all to be seen a little nearer to do full justice to it in detail. Before anything is done, or determined finally, the Committee, as we think, should study well this real beginning of the adornment of S. Paul's.

The very first thought therefore that should fill the mind in this work at S. Paul's, would be the preservation—the preservation, we repeat,—of this architectural adornment of S. Paul's Cathedral, the work of Wren himself. This would be at least a good beginning, for the architect of the building must himself have pronounced it good and fit. It may per-

haps be urged here that Wren may unfortunately have had but little to do with his own work at the time the dome was in actual course of painting, and this unhappily may have been so, and it would be interesting to have the correct *dates* of the several works in S. Paul's as they went on—but the internal evidence of Wren's handwork and mind in it are so strong, if you study the work on the spot, that we feel sure no architect or painter will refuse to the great architect of the Cathedral the credit of this beginning of its "adornment." It may have been but a design on paper, but it is his. We refer, of course, here, it must be clearly understood, to the *painted architecture* which encloses the pictures by Thornhill, and which is quite distinct from the paintings themselves.

And this at once brings us to the next item in the attempt to "adorn" S. Paul's—the pictures themselves, by the painter Sir James Thornhill. They are eight in number, the dome surface being subdivided into eight compartments, arches and pilasters enclosing each picture. Nothing can well be happier, or more in harmony with the built up and stone architecture of the Cathedral, than is this *painted architecture* on its dome. The painted architecture compels the painted pictures to fall in with the built architecture, and frames the pictures and makes of them a part of the Cathedral itself. It is worth attentive study by the Adornment Committee.

It will conduce to clearness if we take these pictures in the order in which the history of the Great Apostle of the Gentiles is told in the Acts of the Apostles. There are eight compartments, or panels. The subject of the first is taken from the 9th chapter of the Acts, and the 4th verse; and represents the Conversion of Paul. "It came to pass that he drew nigh to Damascus, and suddenly a light from heaven shone round about him, and falling on the ground, he heard a voice, saying, Saul, Saul, why persecutest thou me?" It would be curious to sum up, were it possible, the number of times and ways in which this striking event in the world's history has been treated by diverse painters and draughtsmen. Still more curious would it be to note the different ways in which the special individuality of each artist has manifested itself. Rembrandt, Rubens, Raphael, M. Angelo, the Early Italians, the purely Gothic men, and then the solemn Romanesque—how totally different their individual treatment of such subjects!—light and shade, colour, expression, form, quaintness, each predominating according to the power of hand and mental strength of the executive artist, and more or less influenced by the spirit of the age he lived in. Thornhill did not live in a very happy time for such work as this, and it is really surprising to note, considering all things, how well he has done his work. We may fairly say that the art of the "Renaissance" and the work of Rubens—and such men as Rubens were his teachers, with, it must be admitted, a faculty of his own; for no amount of the mere study of other men's work, however great, can make a painter of a man without some original power of his own; Thornhill has most surely evidenced the possession of this power. To give a perfect and complete representation of this scene, is perhaps beyond the power of any one mortal. We can expect only to get a glimpse of the scene here and there, and if we can do this honestly from the hand of Thornhill (and we contend that this is so) we are content. We have the best work the age could give us in S. Paul's Cathedral dome.

In the next compartment is a scene from the 13th chapter of the Acts, v. 11. It represents Elymas the Sorcerer struck blind. "Paul filled with the Holy Ghost, looking upon Elymas, said:—Thou shalt be blind, not see the sun for a season; and immediately there fell a mist, and a darkness upon him, and going about he sought some one to lead him by the hand." It will be recollected by all



that Raphael in his famous cartoon has himself represented this scene, and the two may be compared. In power of dramatic rendering there can be no question between these two men, but as an illustration of the striking scene, and as compared with those usually in the eye of the public in prints and books, Thornhill's work is powerful and instructive. In mode of treatment and style it is fitted for the place it occupies, and most surely is it far beyond any such manufactured work as the "mosaics" to be met with nowadays every here and there.

The next picture is taken from the 14th chapter, verse 15, and pictures Paul and Barnabas at Lystra. "When the Apostles, Barnabas and Paul, had heard that the priest of Jupiter was about to offer sacrifice of oxen, they, rending their clothes, leaped out among the people, crying—Ye men, why do ye these things?" In these orderly times it is difficult for any imaginary power, however vivid, to call up such a scene as this; and almost any visible thought about it, worth any sort of notice, affords help. To the many who read the chapter it illustrates, it is a great picture, for it shows in a large and lifelike and suggestive way what did happen at Lystra. The scene next following is the wide-world known "Prison Scene," in which Paul and Silas found themselves "for disturbing the city." "And suddenly there was an earthquake, so that the foundations of the prison were shaken, and immediately all the doors were opened, and the bands of all were loosed. The keeper of the prison would have killed himself, fearing all had escaped, but Paul cried out with a loud voice, Do thyself no harm; we are all here." This striking scene Thornhill has painted on the S. Paul's dome, and whatever may be its merits as compared with its rendering by other masters and illustrators, it is surely more entertaining and instructive than the mere gilding of ornamental details, or than simple "marbling" can ever be!

The fifth panel in the order of the history is taken from the 17th chapter, verse 23rd, and is again illustrative of a famous and world-momentous event—Paul preaching to the men of Athens. All the great Apostle's power and eloquence was indeed here needed; for the "men of Athens," we are told, and even strangers, so full of life was the city, "employed themselves in nothing else but either in telling, or in hearing some new thing. But Paul, nothing daunted, preached to them standing in the midst of the Areopagus." Paul preaching has been the subject of so many efforts by all degrees of art power, and in all styles of art, that it would perhaps, could we see them all at one view, be hard to say which is the best and most near the truth of the matter. S. Paul himself was but of "mean stature," but the painters have imaged him as a man of commanding stature, and imposing presence, and with outstretched arms and flowing robe have idealised for us, considering our own tame ways, the idea of a "preacher" of the "Everlasting Gospel." Any worshipper in S. Paul's may thus, if he will but look at it, see in the dome of it a very fair portrait of a "preacher"—unlike enough, it is true, any living preacher he may chance to see and hear in this place, but all the more instructive from the contrast it presents. That we are fast running away from the ways of the old world is certain enough, and this picture of Thornhill's may help to show us, not untruthfully, how far. It is better than a slab of marble or even marble mosaic, however costly, and we hope it will not be blotted out.

The next panel in order is an illustration of verse 19, of chapter 19th, of the Acts. "And many who had followed curious arts brought together their books and burnt them before all." Thornhill in his representation has shown some considerable power of natural action in the figures which go to make up this scene. A temple is seen in the background, which is well placed as forming a necessary part of the picture; and it may be said

generally that the painter has been not a little successful in the designing and placing of the architectural accessories of his pictures, better in this way than Raphael himself, who generally got his "architecture" to look too toylike and artificial, attractive though it always is and characteristic.

We now pass, missing much in the life of the great Apostle, to the world-known event of Paul before Agrippa, and a more vivid and living portraiture of a past event does not exist than this 26th chapter. "Agrippa said to Paul, Thou art permitted to speak for thyself. Then Paul, stretching forth his hand, began to make answer," and to tell the story of his life as a Pharisee, and of his miraculous conversion; and in the 28th verse, it is said, "Agrippa said to Paul, Almost thou persuadest me to be a Christian." It is this point in the narrative that has been chosen by the painter to illustrate. It harmonises well with the rest of the compositions; and, with its throne, and its architectural surroundings, and flowing drapery, in which Rubens so much delighted, makes up a gorgeous picture, affording a sort of kingly idea of the magnificence in which Imperial Rome managed the world through her lieutenants and vice-kings. It is not literally correct, of course, as to costume or accessories, but it is pleasantly suggestive, like Ruben's work, of kingly magnificence and splendour.

The last picture, the eighth of the series, is representative of that scene in the life of S. Paul which is told in the 6th verse of the 28th chapter of the Acts of the Apostles, wherein Paul, in the Island of Melita, in the act of kindling a fire against the wind and cold, "A viper coming out of the fire fastened on and stung his hand, but which he shook off, suffering no harm." This Thornhill has painted, and we would only say of it that it completes the series. Thus do the whole of these pictures of the life of S. Paul, with their accompanying and surrounding architecture, form the nucleus really of the "adornment" of the whole building, and a key to a great and harmonised work, venerable, and to be praised in very many ways, and reading not a few art lessons. More than all, they come down to us from the very building of the Cathedral, and mark the age that produced them. *Esto perpetua!*

Thus we have a portion at least of the Cathedral of S. Paul decorated or "adorned" more or less efficiently; right in principle, certainly, and harmonising with the rest of the architecture of the building. What a vital point in a problem of this nature is this harmony of colour—the pictures with the stone surface. And here it is, again, that the unfortunate "restoring" process, which has done such a heap of evil, has again stepped in. The whole surface of the "drum," as it is termed, of the dome above the Whispering Gallery, including pilasters, and cornice, and niches, have gone through the oil painting process, i.e. the "dirt" of the pamphlet. The very first thing, therefore—as we feel bound to contend—is to cleanse away all this "dirt," or oil paint, without delay, and thus to restore the dome of S. Paul's; to bring back the stone colour. We may mention, in passing, that one or two of the niches have been left unpainted by some chance. Thus the twofold object would be, to clean off the paint, and to restore the harmony of colour between the paintings above, and the stone drum and pilasters beneath. Thus far the dome of S. Paul's. But there is yet one thing more which we must earnestly commend to the attention of Mr. Burges. It is to restore the glazing of the windows in the dome. Some of these windows are yet as Wren left them, of clear glass, letting in sunlight, and allowing passing changes of weather to be seen. Mr. Penrose in an evil hour shut out all this from one portion of this circlet of windows, putting in the place of the clear glass of small panes,

large ground glass panels, so that the direct rays of the sun cannot enter—a woeful mistake to accomplish. It may encourage Mr. Burges in this little true "restoration" to be told that Professor Cockerell himself allowed, when we once on a time reminded him of it—that the most glorious "decorative" effect ever to be seen in S. Paul's was the sun's rays piercing through the misty air into the dome.

C. B. A.

### LECTURES ON ART AND ARCHITECTURE.—III.\*

BY ALEXANDER THOMSON, I.A., ARCHITECT, GLASGOW.

IT has been customary for writers on architecture to say that the architecture of the Greeks was derived from that of the Egyptians. But whether that is a fact, or to what extent the borrowing or stealing process was carried on, it is now impossible to ascertain, as the connecting links are wanting. It is supposed that the Greeks destroyed their failures, for the earliest examples of their architecture which remain are complete in all their essential parts, and are only less elegant than those that are regarded as the greatest triumphs of human genius. Yet some modern authors, and especially Mr. Fergusson, see no difficulty in establishing the relationship, and point to what they call the proto-Doric of the tombs at Beni-Hassan as settling the question. Now there can be no doubt that if the Greeks had had a mind to copy the Egyptian style of architecture, they had ample opportunity. Long before the Parthenon had reared its resplendent front above the battlements of the Acropolis of Athens, the Greeks and Egyptians were on terms of almost familiar intercourse; and there is nothing more likely than that the rising civilisation of the Greeks should appropriate from the mature civilisation of the Egyptians whatever seemed desirable. The question most interesting to us is, what did they take? For, if we, who are without a style, and profess to be in earnest search for one, could only fall in with some architectural embryo that might be hatched into a church or a mill, we would be well rewarded for our pains. The so-called proto-Doric of the tombs at Beni-Hassan has none of that indescribable subtlety about it which attaches to some other things of a similar kind. It is quite easily described, and its lineage is as easily traced. It is a straight, up-and-down, fluted shaft, capped with a square abacus; and its history is clearly seen in existing forms. There is, first, the ordinary square pier; next, the eight-sided one—that is, the square pier with its angles cut away; then, suppose the obtuse angles of the eight-sided pier cut off, we have a sixteen-sided one; and, finally, suppose each of those flat sides hollowed a little, and we have the fluted shaft of this proto-Doric column. (In the examples usually referred to, the centre facet retains its original flatness, as there is upon it a hieroglyphic inscription). Now, it will be observed that this is for the most part rather a mechanical and utilitarian process than an artistic one; for, when all is done, there is really nothing in this form to admire. There is no recognisable proportion between its thickness and height; nor is there any relation between those and the superincumbent lintel. In short, its chief recommendation seems to be that it affords great room for improvement; and this, to a certain class of minds, would be sufficient reason why it should be chosen in preference to the more highly-developed columns of the Great Hall of Karnak, and of their fine examples. To those who look merely at the outside of things, there is doubtless a striking similarity between the shape of this object and that of the column of the Parthenon. And I call your attention to the comparison, as an instance of the prevailing materialism which is so foreign to the spirit of art. The real difference lies in the fact that the one is a mere piece of quarryman's craft, the other is a marvel of wisdom and skill. The same penetrative power of intellect which discovered the origin of Greek architecture in the polygonal piers of the Egyptian tombs was supposed to have brushed a good many leaves from Shakespeare's laurels when it was shown that Romeo and Juliet, Hamlet, and others of his famous plays were founded upon old stories. But

\* Delivered at the Glasgow School of Art and Haldane Academy.



although old stories without number have since been brought to light, there is no corresponding crop of famous plays. . . .

There is very little doubt that the Greeks learned much from the Egyptians and from other peoples who were before them in point of time with their architectural developments; but you may be assured that they learned most from the best examples, and nothing from things that contained nothing. "Men do not gather grapes of thorns, or figs of thistles," and the best way for them to imitate the Greeks is rather to follow their example than copy their work. The majority of architectural writers say, and the great majority of people who give themselves any trouble about architectural matters believe, that Greek architecture is a limited thing, and that the shortlived effort at its revival, which was witnessed at the beginning of the present century exhausted the whole resources of the style, and consequently it has been cast away like a bottle which, they admit, contained most excellent liquor, but being empty is utterly useless for any practical purpose. This is a great mistake, and reflects the utmost discredit upon those who hold such views. In so far as variety of material shapes is a desirable characteristic of an architectural style, this doubtless may be found to prevail in other styles to a much greater extent than in the Greek; but if regard is to be had to the quality of the shapes, we are at once brought to a point which requires consideration. Variety is doubtless a very important element in architecture, but it is not all-important. Shakspeare, who saw into the art of things, makes Macbeth say, "I dare do all that may become a man: who dares do more is none." Now, this matter of variety may be carried beyond due bounds, and come to resemble an Irish turnip-field of which I read in a newspaper last summer: It bore a somewhat scanty crop of the prosaic but useful bulbs, but, by way of compensation, showed a luxuriant and interesting display of indigenous weeds, of which an enthusiastic botanist counted no fewer than thirty-two varieties in a single drill. And we may be sure that those uncultivated sons of the soil would assert their freedom by growing just where the winds of heaven had strewn their seeds, without the least regard to order, but, on the contrary, manifesting a strong disposition to break through and overpower the disciplined lines of the invading turnip." Now here were two opposing elements in conflict in this field—the wilderness against the farm—the random forces of nature against the selection of art. A skilful farmer or gardener is not averse to a certain amount of variety, but it must be under control. The gardener, while gratifying the desire for variety, at the same time puts it under subjection to the law of harmonious contrast. He does not throw a handful of all sorts of seeds into his beds, but, while contrasting the one with the other, keeps every sort by itself, and by this means, when they spring up, the best individuals of each sort are readily distinguished from the general mediocrity, and may be selected for further development by special treatment, their offspring being again and again subjected to the same process, until, in the course of time, we have very different and very surprising results from this mode of selection. We may, on one line of development, have the root swelled out until it becomes a turnip; in another, the stem, as in the kohlrabi; in the third we have the leaves expanded and wrapped together, as in the cabbage; and, in a fourth, we have a blossom enlarged and consolidated, as in the cauliflower; and yet the typical form,—and perhaps the common parent of all these,—might be seen occupying a conspicuous place in the Irish turnip-field, in the shape of what is commonly called wild mustard.

Insubordinate variety in architecture is a sure sign of want of culture. It is characteristic of the more barbarous styles, in which poverty of thought is supposed to be compensated for by great size, excessive elaboration and ornamentation, and by lavish expenditure of costly material. In Gothic architecture we find variety adopted as a leading principle, and carried with a nobleness of spirit and a degree of artistic skill which I shall take care to do ample justice to when I come to speak of it. We are told that, besides being deficient in variety of detail, the Greek style is wanting in flexibility. There is a difference between these two qualities; but, as they are nearly allied, they may be dealt with very much in the same way, and we will find opportunities of speaking of them as we proceed. When we compare Greek architecture with some other styles it must

be borne in mind that there are very few examples of it remaining. In fact, all the examples which have hitherto been regarded as models for study or imitation are to be found on the Acropolis of Athens, or in its immediate neighbourhood, and may easily be enumerated. Like the Muses, they are nine. Of these seven have been used in Glasgow: the Agora, with the Choric monument of Thrasyllas, furnishes details for our Custom House; the small temple on Ilissus (considerably enlarged) has been copied on the front of Wellington-street United Presbyterian Church; the Tower of the Winds on the end of the double range of houses between the Great Western and New City Roads; the Choric Monument of Lysicrates on the Merchants' House, Hutcheson-street; the Erechtheum on the Royal Bank, also the Municipal and County Buildings and the Parthenon at the Court House fronting the Green. And, if you will put yourself to the trouble of examining these examples you will find that, though so few in number, there is considerable variety, and that all are very good. This was surely very scant material from which to furnish the world with architecture. Yet that was what the promoters of the Greek revival proposed to do, and they failed, not because of the scantiness of the material, but because they could not see through the material into the laws upon which that architecture rested. They failed to master their style, and so became its slaves. Nevertheless, the buildings which constitute the glory of Edinburgh, and which entitle it to be called the modern Athens, were the fruits of this movement and of the concentrated intelligence of British society, which at the time had its seat in our northern capital. And had it not been for the terrible commercial crisis of 1826, which exhausted its energies, and left it prostrate for the succeeding 30 years, there is no saying what the talent of its architects and the influence of its intelligence might have accomplished throughout the country. London was less fortunate in its share in the revival, and has little that is good to show. But what, I would ask, would Liverpool be without its S. George's Hall, and what might not Elmes, its architect, have done had he not been cut off in his youth? We are now devoting our attention to another revival upon the same plan, and with no better success. For the last 50 years we have been rattling and fumbling amongst the fossil remains of the great Gothic mammoth, but as yet there is no sign of returning life. Finding it impossible to apply Gothic architecture to the wants of modern society, we are now called upon to abandon the paths of modern progress, and to grope our way backwards into the gloomy recesses of the Middle Ages. It is to be hoped that when we have worked through the present revival, and found it nought, we may think of doing something for ourselves in the department of architecture, as we have done in other lines of effort.

The element of variety in itself possesses that kind of interest which we find in a story. Flexibility in its ordinary form belongs to that quality of accomplishment which we call cleverness, such as we observe in feats of agility or sleight-of-hand. Neither is essentially of the things which are a "joy for ever;" the pleasure they afford is evanescent; as soon as we comprehend them our curiosity is satisfied, and we care no more about them. Moreover, while these two elements are indispensable to good design, and under certain conditions are capable of affording a very large degree of gratification, they may be, as we have seen, overdone; they may, in fact, as readily belong to the faults as to the merits of a style. But I come now to speak of other two elements which we find carried to a very high degree of excellence in Greek architecture, and which have never been overdone, and never can be overdone. These are beauty or symmetry of form, and harmony of relative proportion; and these are the essential elements of Greek architecture, distinguishing it from all other styles. And these also are the essential elements of the beauty of the higher animal forms which distinguish them from all the other forms of nature. Physically, or materially, a Greek temple is not the least like the human form, or any other natural form, but, in principle, it bears a very close resemblance. In fact, it is the only style of architecture which harmonises with the higher class of sculpture and painting. All other styles are ruder or stronger in their parts. Indeed, I may say that amongst the different existing styles or orders of Greek architecture the Doric is the only one that is in strict and perfect harmony with the delicacy of outline, the subtle gradations of

light and shade, and the justness or truth of the relative proportions of parts which characterise the human frame. Now, I do not mean to argue that because this is matter of fact in regard to the Doric of the past, that we should continue to repeat it just as we find it in the Parthenon. When we think of devoting the very highest effort of artistic genius to the service of God, as the Greeks did to their Minerva, and as our instincts tell us we should do; when we have achieved anything worthy of being commemorated in the noblest style of architecture with its complete complement of sculpture and painting, it can only be done by preserving perfect harmony amongst all the elements which compose the work. But these principles may be embodied in quite a different form from that of the Parthenon: and when British society comes to be as highly refined as the Greek once was, and when it has made its demands on its artists as persistently as it has done on its mechanics, it will be responded to in like manner.

Whilst the Greek temple varies in form to some extent in different examples, there is nevertheless a particular form which is considered proper to the style, and which we find generally adhered to, or aimed at, in the best examples. The Greek, like the Egyptian temple, probably began in a simple cell with a door in one end. In the next stage a porch was formed by extending the side walls; and between the piers or antæ, formed by the ends of the walls, were placed a couple of columns upon which the entablature and cornice were carried. In the third stage we see a farther extension into a portico of four columns in front of the original porch; in the fourth, while the three first-mentioned are retained, the whole is surrounded by a row of columns forming what is termed a peristyle; and in the great temple of Jupiter-Olympus and the temple at Ephesus there was a second row outside the first all round. I have stated that Greek architecture is based upon principles similar to those that we recognise in the higher animals—that is to say, every form and outline is meant to be the best of its kind, and every part bears some proportion to the adjoining parts and to the whole. The form is a simple unit having no excrescent parts, and in the best examples is a little more than twice as long as it is broad. For instance, the Parthenon has eight columns in the width and seventeen in the length; and the temple of Theseus six in the width and thirteen in the length. In the Doric we have the first truly architectural peristyle; for, although Mr. Fergusson, in his easy way, sees its original in the small square porches in front of some of the Egyptian temples, these were merely roofless enclosures with four columns on each face, having no cell or inner wall, and consequently without the great deep shadow which so finely reveals the delicate symmetry of the columns, and gives such dignity to the whole. This simple peristylean form is the most majestic and beautiful that architecture has ever assumed. In especially such a building as the Parthenon, where the number of columns, seen partly in front and partly in flank, are more than the eye can readily count, and yet the effect not as of a number of parts, but as a combined form, we are impressed with a feeling akin to that produced by the sight of a body of disciplined soldiers, a phalanx of heroes, for each column seems the embodiment of a noble soul.

The colonnade stands upon a stylobate of three degrees, and is surmounted by an entablature consisting of an architrave, frieze, and cornice, and at the front and back ends, or, as they are termed, the portico and posticum, rises into a flat triangular form, called the pediment, following the outline of the roof of which it is the termination, and corresponds to the gable in ordinary buildings. All these features or members are proportioned to each other with a degree of nicety which defies criticism. The frieze is divided lengthwise by what is called triglyphs, one over each column, and one over the space between each column. The spaces betwixt the triglyphs are called metopes. These, together with the tympanum or inner part of the pediment, were usually filled with sculpture, which formed such an important element in Greek architecture, and, as I have said, especially in the Doric temples.

The Ionic stood next to the Doric in favour with the Greeks. It is less severe, and perhaps more elegant; and from the air of softened refinement which pervades the whole, it has been called the feminine of the Doric. This idea has been wrought upon so as to establish the analogy even in material features. The proportions are



slender and ladylike; the volutes are supposed to represent the long hair, so highly prized and so variously treated as an ornamental feature by our sisters in all ages; the neck is richly decorated, the fluting representing the long folds of hanging drapery; and the mouldings of the base are regarded as the continuation of the drapery spreading outwards upon the ground. The Doric is altogether more masculine in proportion; the capital is without decoration of any kind, and the fluting of the shaft is broader and simpler, and terminates abruptly upon the ground without a base. While all the parts of the Ionic are quite distinct from those of the Doric, the feature that is most characteristic is the capital of the column. A good deal of discussion has taken place as to its origin, as to what it is intended to represent, and as to its merit as an artistic form. From Mr. Fergusson's eminent position as an historian, he sees it in the distance coming from Assyria and Persia. And doubtless, if the Greeks, under a feeling of helplessness from an extreme poverty of invention, had thought of appropriating such a thing as this scroll, they had sufficient opportunity in their frequent intercourse with these countries to have done so; but in this, as in the case of the Doric, the merit is all Greek. Then, as to what it is meant to represent, I would say that whatever the Creator meant to represent by all the spiral forms of nature the Greeks had the same purpose in view. It is a form that is found very frequently in nature—in the proboscis of the elephant and of the butterfly; in shells, in locks of hair, in the fronds of the fern, and in the little forget-me-not. It is, in short, a very pleasant form to look upon, and I do not remember any style of decoration that is without it—it is very notable in our own Celtic style. But Mr. Ruskin regards this capital as a thing abominable, because it does not represent any natural object; and, indeed, he scouts at architecture in general for the same reason, admiring its decorations only when they happen to be natural. I have in a former lecture shown you that we should not regard nature as the source of art, so it will be unnecessary here to say anything about this particular application of Mr. Ruskin's theory. Regarding the Ionic capital as an artistic form, it is certainly a very remarkable one; and it is not at all to be wondered at that those who look exclusively for representation in art should have been fairly puzzled by this singular object. Looked at in front it appears as if several webs of cloth had been rolled on two pins from opposite ends until within a short distance of each other, with a slack part left between the coils. But looking at the end we see at once that such a process would not produce the result. The pins cannot be accounted for; indeed the thing cannot be accounted for on any other ground than that it is an artistic invention. The lines on the end are totally different from those on the front, and yet they seem to be flowing in the same course, so that in looking at it on the angle, where both front and end are seen at once, it presents an interest arising from variance in harmonious agreement with similarity. From whatever point we look at it there is a pleasing softness in the flow of the lines with ever-varying proportions of the volutes, as they appear more or less oval according to the position from which they are viewed. And these, with the other features of the thing, form a combination at once simple and complex. The simplicity of its form enables the mind to comprehend it easily; the complexity of its beautiful lines causes the memory to dwell upon it with pleasing reflection. Considering the dissimilarity between the front and ends, it might be supposed that this capital was not suited to a peristylar building. But although none of the Athenian examples of which there are any remains were of this kind, they show a contrivance which adapts it to the purpose. This is an angular volute upon the capital of the extreme columns, by which it is made to show a face on both the front and the side. The difficulty is thus so far overcome, but the effect is awkward, and this awkward effect so conspicuous, that we feel surprised that the fastidious Greek eye could regard it with any degree of toleration.

A very remarkable peculiarity of the Athenians in regard to their architecture was their apparent disregard to the element of size or bigness. With the exception of the Parthenon, all their buildings were comparatively small, and some of those which have excited the admiration of the whole civilised world are quite diminutive. Their greatness was of the intellectual rather than of the

material kind. There are engravings of the Hercules upon gems which show as much greatness of style and expression as if they were colossal statues. The small Ionic temple on the river Ilyssus, near Athens (now unhappily destroyed) had more dignity of character than any other in this style, and yet the column was under fifteen feet in height—very little larger than those used in door-pieces all over the west end of Glasgow. The most elegant example in the Ionic style is the Erechtheum, rather a group than a single building. And the picturesque variety of its composition appears in remarkable contrast to the concentrated grandeur of that noble pile near which it is situated. It consists of three temples with four porticoes, each standing on a different level, and all arranged with such an apparently studied violation of symmetrical order as almost to lead to the supposition that it was placed there as a foil to the Parthenon. But, notwithstanding its irregularity, the symmetrical beauty of its parts is so perfect that it is considered one of the most charming compositions in existence, showing that Greek architecture, so far from being stiff and inflexible, was made to serve any purpose that was required of it, and at the same time to look a great deal more beautiful than any other style. The three temples composing this group are those of Erechtheus, Minerva-Polias, and Pandrosus. The first has one portico, the second two. These three porticoes are Ionic, but each somewhat different from the others. Under the larger portico of the temple of Minerva-Polias we have the beautiful door which has been frequently copied. The smaller portico looks like one of our modern contrivances. It consists of four columns in antis, not entirely round, but, as it were, in high relief, attached to the end wall of the temple.

#### FOREST CONSERVANCY IN INDIA.

A VAST quantity of useful information is published by Government under this head, but few will care to wade through the 1,671 large and closely-printed pages which form the two blue-books. In a condensed form it will, no doubt, be acceptable, as being an authorised statement of our East Indian timber resources. The Conservator of Forests, Central Provinces, states that injudicious felling has affected the soil and climate of the Wurdah Valley, and that protection against such measures is now afforded. These forests, from the Wurdah River, in the west, to the Bore River, in the east, have long ago been exhausted by the demand for fuel and building-timber. There is now an almost continuous belt of reserved forests extending from Ummurkuntuk in the east, to Asseergurh in Nimar in the west, all along the range of the Sautpooras. Commencing from the east, the old forests extend from Ummurkuntuk to Rangakhar, and close attention is now being given to them. Next to them come the great bamboo forests of Saleetokree, which are untouched, and present a belt of bamboos 40 miles broad. West of the Wyngunga, the great Sautpoora reserve extends for nearly 150 miles, succeeded by the smaller reserve of Deogurh, at the head of the Kanham River; west again, the protected forests of Mailghat, in Berar; the Wurdah reserve and the Kaleebheet reserve fringe the various ranges into which the Sautpooras become split up. The forests have recently been devastated, it is true, but certainly there is ample protection now along the whole range of ghâts. What is wanted now is care for the groves of trees in the plains, the protection of those which exist, and the planting of others to come on in future.

In Oudh 204 acres were examined, and on this area were found first-class trees, in girth above 6ft., 703; second class, in girth above 4ft. 6in., 1,100; third class, above 1ft. 6in., 6,955; fourth class, below 1ft. 6in., 5,645. This gives first-class trees per acre, 3·3, and per square mile, 2,205.

The forests producing sâl between the Sardah and Korially rivers, which have been surveyed and demarcated, contain upwards of 150 square miles. Assuming, then, that the whole of these 150 square miles contain first-class trees at the above rate there would be between the Sardah and Korially rivers, 330,750 first-class trees. The number of second-class trees counted was 1,190; this would give for 150 square miles 559,500 trees. Oudh does not seem favourable to the growth of sissoo.

The Conservator of Forests, Lower Bengal, states that the report on the Eastern Bengal Dooars he

has received gives a melancholy but true history of forest tracts generally in Bengal, which, but for bad, or rather total want of management and due appreciation of their real value, would now be yielding immense stocks of timber and large returns of revenue. The statement annexed to the report shows an estimated area of 364 square miles of sâl forest in the tracts traversed (and only a superficial examination could be made), besides which there are other tracts containing valuable trees of all kinds. Now, assuming a rotation of 100 years (we have no precise data to go upon) as a period required to bring a sâl sapling to maturity, and that only 250 square miles of this area were covered with forest, we should have the produce of 2½ square miles of forest to bring out every year. At this rate, 2½ square miles would give us 40,000 trees to remove yearly, or about 80,000 logs, from the Eastern portion of the Dooars alone; enough to supply the largest demands. Owing to past neglect, these tracts at present only produce small house posts for the most part, and it is urged that the forests should be closed for a time sufficient for their recovery.

In Burmah (British), it may be hoped that on the area now under cultivation there may be, in 60 or 80 years hence, upwards of 38,250 first-class teak trees ready for the market, and these from plantations now in infancy. Five or six years ago the yield of the year was 33,104 tons, and the weight of foreign timber passed through the frontier stations of Toungoo and Thayetmyo, and the revenue station of Kadoe (Maulmain), is reported by the conservator at 73,703 tons, the small turn out, as compared with former years, being attributed to the disturbed condition of the Shan and Karenee States. Burmah also produces valuable Pyinkadoh, the area of the principal forests being about 200 square miles. The total quantity of pyinkadoh of the three first classes in the Sandoway Deputy Commissionership, and Taline-toung, where the principal forests are situated, amounts to 2,560,000 trees, and a point of importance is their soundness, as no decay has been found, save such as is caused by serious injury, except in Akyab. The greater portion of the annual yield is at present cut into railway sleepers and exported to Calcutta and other places, and the different forests vary in the percentage of trees fit for this purpose, and trees giving less than three sleepers are designated as unfit. The following is the percentage of these fit for converting into sleepers:—

FOREST.		
South of Toungoo	equal	50 percent.
Between ditto and Au Khyoung	"	80 "
Ramree and Kyouk-phyo East,	"	20 "
Au Khyoung and Roo	"	60 "
East of Lemroo River	"	30 "
North of Arakan	"	15 "
Ran Khyoung, Lower Part	"	15 to 20 "
Ditto Upper Part	"	60 "

Each of these trees gives six sleepers on an average. This is only a very small item of the voluminous reports referred to, and abridged as much as is consistent with giving the reader a fair idea of the resources of the districts dealt with. Another opportunity may present itself of continuing the account, until all the great Indian forests have been passed under review.

#### CHIPS.

People fond of buying Japanese metal-work and curiosities will be pleased to read the following advertisement taken from a native newspaper:—"For sale, at Kama-Kura, a very fine idol, with six arms. It is 15ft. high, and was cast in bronze, at Sheffield."

The statue of Mr. Charles Majoribanks, at Coldstream, N.B., which was struck by lightning last year, has been restored by Mr. Currie, of Darwick.

The foundation-stone of the church and schools of SS. Anne and Elizabeth were laid at Hapton Green, near Burnley, last week.

In the course of the excavations at Durham Cathedral, the tomb of Bishop Pudsey, one of the earliest founders, and who endowed the cathedral, and completed many works in connection with the city and county to a greater extent than any of the earlier bishops, was come upon on Monday.

The Lord Mayor and Sheriffs of London on Monday opened West Ham Park, near Plaistow, Essex, the gift partly of Mr. Gurney and partly of the Corporation of London to the public. The park is about 80 acres in extent.

We regret to hear that Mr. Ewan Christian is seriously unwell.



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## ILLUSTRATIONS.

COTEHILL HOUSE, CORNWALL—SHOOTING LODGE, SANDRINGHAM, FOR THE PRINCE OF WALES—UPSAL CASTLE, YORKSHIRE.
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## OUR LITHOGRAPHIC ILLUSTRATIONS.

## COTEHILL HOUSE, CORNWALL.

THIS noble mansion is situated on the western banks of the river Tamar, and was erected during the reign of Henry VII. It is described by Carew in his survey of Cornwall as "ancient, large, stronge, fayre, and apurtenanced with the necessities of woode, water, fishing, parkes and milles, with the devotion (in times past) of a riche furnished chapelle and charitie of almshouses for certaine poore people whiche the owners used to relieve." The interior is full of historic interest, containing, as it does, a large quantity of ancient war implements, armour, painted glass, furniture, tapestry, &c., and is always open to visitors. There is a fine elevation towards the quadrangle, a sketch of which I have not the good fortune to possess. Probably some of your readers can furnish it.

H. A. G.

## SHOOTING LODGE, SANDRINGHAM, FOR THE PRINCE OF WALES.

One of the views we give this week illustrates a Shooting Lodge for H.R.H. the Prince of Wales, on the Sandringham estate, Norfolk, from designs by Mr. C. S. Beck, Glasgow. It is pleasantly situated on an eminence, having an extensive view of the surroundings. The plan is designed for the accommodation of his Royal Highness and company when out shooting. The walls are built of the local Car stone in block and rubble, with red brick dressings from a local yard. The chimneys were supplied by Mr. Gunton, of Cossey. The ornamental plaster panels were executed by Mr. J. Steel, jun., of Glasgow. Mr. Curtis, of Litcham, Norfolk, was the sole contractor.

## UPSAL CASTLE.

This residence of Captain Turton, of which we present our subscribers with complete reproductions from the working drawings of the architects, Messrs. Goldie and Child, is now building on the slope of the Yorkshire hills which rise above the great plain of York beyond Thirsk. The site is the position of the ancient Upsal Castle (whence its present title), the feudal home of the Lords Scrope, of Masham and Upsal. It is built of a warm-coloured sandstone from the estate, coursed, but with rock face. The dressings are of Whitby and Bedale freestone, excepting the window-cills, which are of Dalbeattie granite, as is also the great archway under the tower. The roofs are slated, though the design of the architects was to employ tiling. Internally nothing has been done, but the chief features will be a very striking staircase in carved oak, and the dining-room, which is to have a carved-oak fire-place and panelling. The chief portion of the work has been done by Messrs. Weathersby and Rymer, builders, of York. It is expected to complete a portion of the interior this year. The outlay for the fabric has been about £8,000 to present date.

## THE NEW GUILDHALL, PLYMOUTH.

THIS important building is to be opened by the Prince of Wales on the 14th of next month. There will be a great Masonic demonstration upon the occasion. The new fabric consists of a group of buildings varied in detail, but combining harmoniously in one general design. They are arranged in two blocks, with a wide open space between. At one end of this stands S. Andrew's Church, with its massive granite-buttressed tower, erected in the fifteenth century by the liberality of a leading townsman, one Yogge. Thus the church and the new Guildhall

form three sides of a quadrangle; and it is intended that the fourth shall be occupied by a structure that shall in no wise discredit its neighbours. The Guildhall buildings are in the Early Pointed style, the details bold rather than elaborate, though the chief portions are highly ornamented. The wings are treated in broad and simple masses, leading up to central features of striking richness and dignity. The chief building material is the blue-grey local limestone or marble, the plinths being granite, and the dressings of Portland stone. Polished serpentine and granite and the fine-grained Mansfield sandstone are also introduced in portions of the exterior. The northern block contains in the centre the council chamber; and on each side, on two floors, suites of offices. There are separate suites for the town clerk, borough treasurer, borough surveyor, and their respective staffs, and in the upper story are the offices of the School-boards and the meeting room of the Plymouth Chamber of Commerce. The chief external features of this block are the great central gable of the council chamber, which is surmounted by a life-size statue of Drake, and angle towers terminating each wing 100ft. high. The leading feature of the southern block is the great hall, which runs lengthwise to the Guildhall yard, and the side elevation of which, therefore, fronts upon it. On the east of this is a building appropriated to police purposes, containing a police court, police rooms, and cells, whilst communicating therewith is a drill yard; retiring rooms are provided for the magistrates, and the clerk has suitable offices. On the west of the great hall are a couple of law courts. At the extreme south-west angle rises the great tower, massive and square for the greater portion of its height, but terminating in a spire. It is nearly 200ft. high. The great hall is 146ft. in length. It is divided into a nave and aisles, the latter being narrow, tiled, and chiefly intended for passages, though they greatly increase the amount of the accommodation. The nave itself is 58ft. wide, and the aisles open into it by two arcades of seven arches each, the massive pillars supporting which are single stones of polished Cornish granite from the quarries of the Messrs. Freeman. The arcades are low, and thus the clerestory, with its seven windows on each side, is very imposing. The roof is open and boarded, with carved trusses. At one end of the hall is a spacious orchestra, and at the other a ladies' gallery. Messrs. Norman and Hine, of Plymouth, are the architects; the contractors are Messrs. Call and Pethick, of the same place. The sculpture has been executed in part by Mr. Trevena, partly by Mr. Hems, and in part by Mr. Boulton. Mr. Tarring was foreman during the progress of the works in the first instance. He was, however, unfortunately killed by the fall of an old wall. His place has since been occupied by Mr. Wise. Mr. John Adams has occupied the position of clerk of works. Mr. Alfred Norman, one of the architects, is Mayor of Devonport.

## CONCRETE HOUSES.

AT the recent meeting of the British Association of Gas Managers (says *Engineering*), a most important paper was read on "Gas-holders in Concrete." About ten days since a crucial test was given in regard to certain kinds of concrete erections, resulting in an accident by which one life was sacrificed, and several others placed in jeopardy. Concrete, if properly prepared, seems well fitted for house-erection; but in the absence of certain obvious precautions, the results of failure may become disastrous.

In the case to which we now draw attention a building had been erected on the New Bunhill Fields Burying Ground (now disused for such purposes) near Islington Church, by the Monolithic Fireproof Company, to show how *safely*, in regard to fire and general uses, concrete may be employed. Two buildings were in course of erection, but that nearest Islington Green came to grief. The walls were erected some eighteen months ago, when it was discovered that the

weight of the roof rendered them inadequate to its support. The building was about 40ft. long and, say, 20ft. wide, with a height of about 16ft. The roofing, which was about 14in. thick, without, at the time, any centre support, showed signs of giving way, and consequently two pillars were erected in the centre to prevent its falling in. But this arrangement proved ineffective, and fresh means were resorted to for insuring safety. On Monday, the 6th inst., it appears that while the clerk of the works and the foreman were knocking away a piece of timber which had been supporting the roof during the construction of the building, with the assistance of two piers, that were to form its permanent supports, the roof came down bodily, and caused the fatal result to which we have alluded. One person was all but instantly killed, and others are still in a precarious state at S. Bartholomew's Hospital.

After a careful personal inspection of the ruins, we can only express the opinion that the greatest carelessness has been shown in the composition of the concrete. Masses of brick, with but a trifle of concrete, have formed the defective portions of the fallen building. How any person could have expected such a building, in regard to its external walls, to have sustained the stress of the roof, is past our comprehension. The manner in which the concrete was prepared and laid inevitably caused the result which has befallen it. Here we allude alone to the purely mechanical character of the structure. But apart from this, taking the fireproof view of the question, how could the constructors expect that a building composed actually of chalk (for the lime is converted into chalk by the action of the carbonic acid of the air), and old brick saturated with moisture, would ever withstand the action of fire?

In reference to properly-constructed concrete erections there can be little doubt that they offer many advantages. As Mr. Douglas remarked in his paper on "Gas-holders in Concrete," to which we have already alluded, the strength of concrete is so much greater than brick and cement that it is unnecessary the dimensions of the concreted work should be more than two-thirds of those of brickwork, taking, as usual, depth and soil into consideration. Besides, cheapness is also in favour of the concrete. But if common-sense precautions be omitted in such erections, it is only to be expected that the natural result of failure should follow. Hence the Islington accident leads to no valid objection against the use of concrete for any purpose.

An important point in the construction of concrete buildings remains to be noticed. The operations of nature in the formation of stone, say Bath, Caen, Portland, &c., is of the slowest and most gradual character. It is very probable that neglect of a somewhat similar condition may lead to several failures in erecting concrete buildings. It takes a long time to "set" ordinary mortar; it is easy thence to infer that when a building is entirely constructed of mortar (for that really is the characteristic of "concrete"), a long time should elapse before its interior fittings, in the shape of joists, floorings, &c., should be completed. Such care having been taken, concrete buildings would no doubt have a lengthened existence and entirely put out of date the "stucco-villas" which Charles Dickens so well satirised.

The committee appointed by the French Minister of Public Works to investigate the scheme for a submarine tunnel between England and France has recommended that on certain formalities being complied with it should be taken into consideration. The experiments described in its report would occupy about a year, and if they were successful a concession would be granted.

The new mission church and school of S. John, Idle, Yorkshire, were opened on Monday. The church will seat 300 people, and the school 400 children. Cost of both, £3,000; architect, Mr. F. Obank.

The next meeting of the Association of Municipal and Sanitary Engineers, will be held at the municipal offices, Barrow-in-Furness, on Friday the 7th. of August.



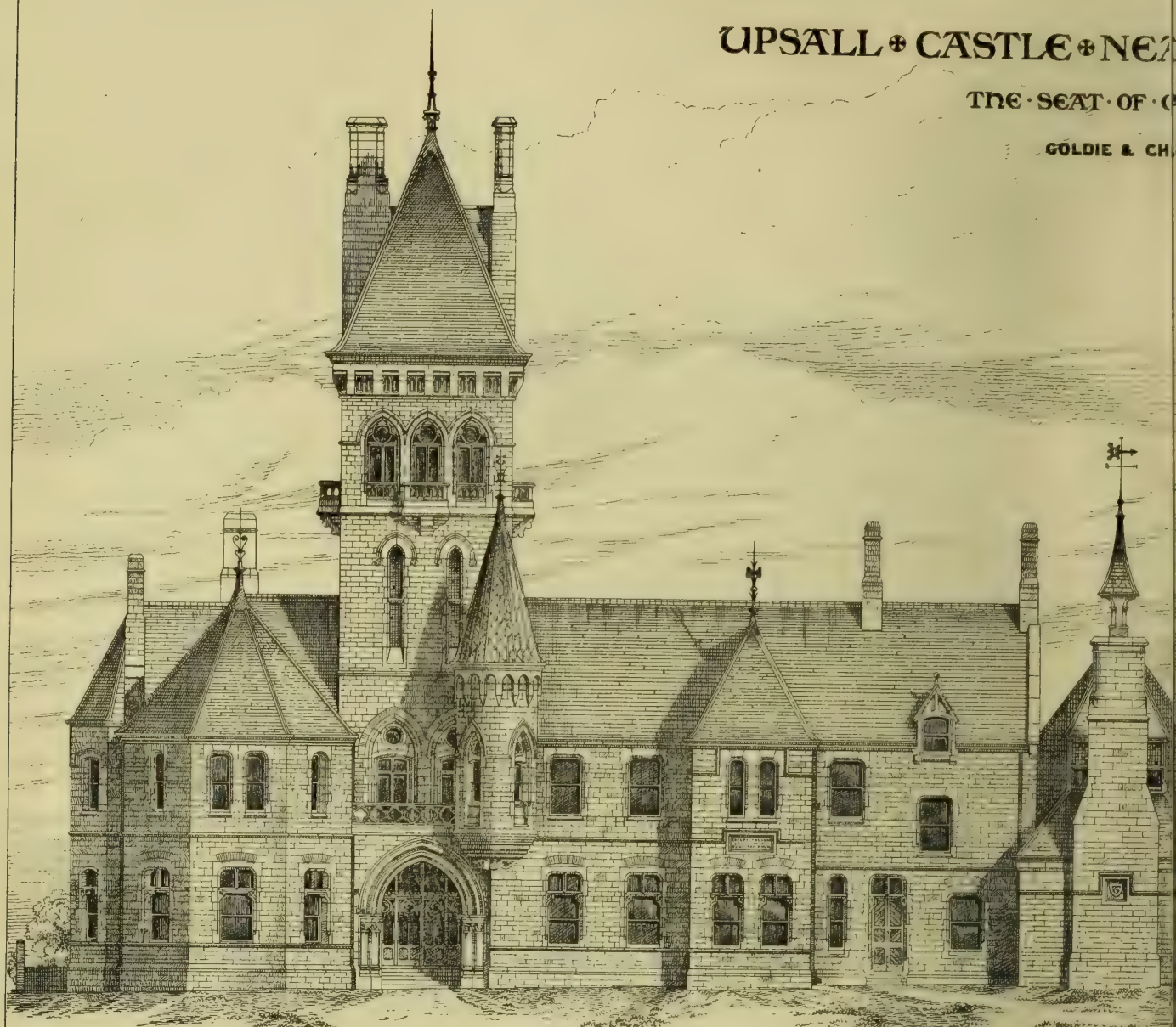




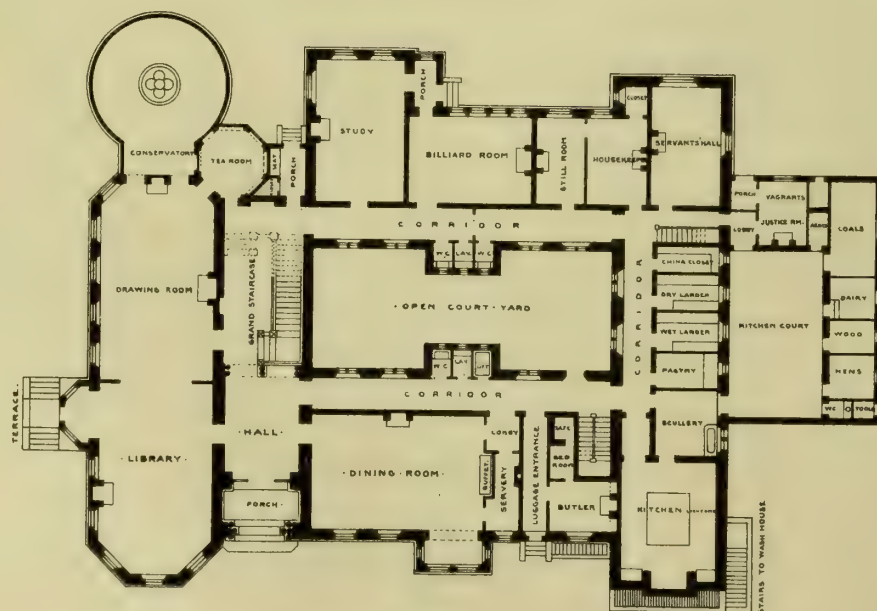
# UPSALL • CASTLE • NEAR

THE SEAT OF

GOLDIE & CH

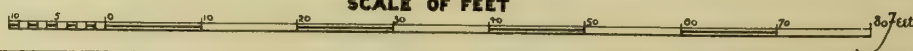


ENTRANCE FRONT (EAST)



GROUND PLAN

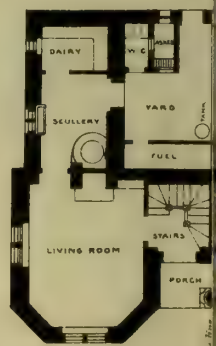
SCALE OF FEET



ENTRANCE



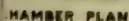
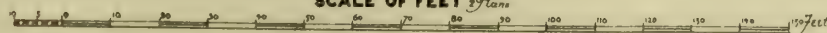
FRONT



GROUND PLAN



## ARCHITECTS

SCALE OF FEET: *2 Mms*











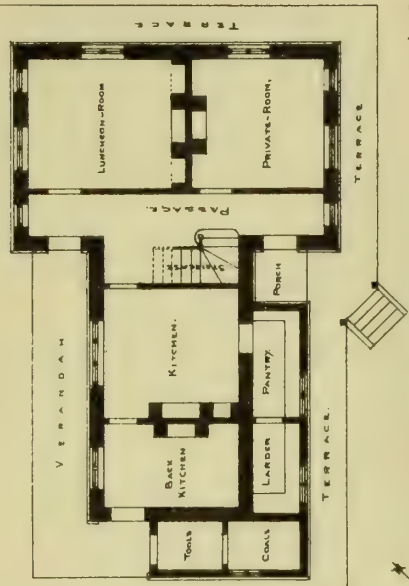
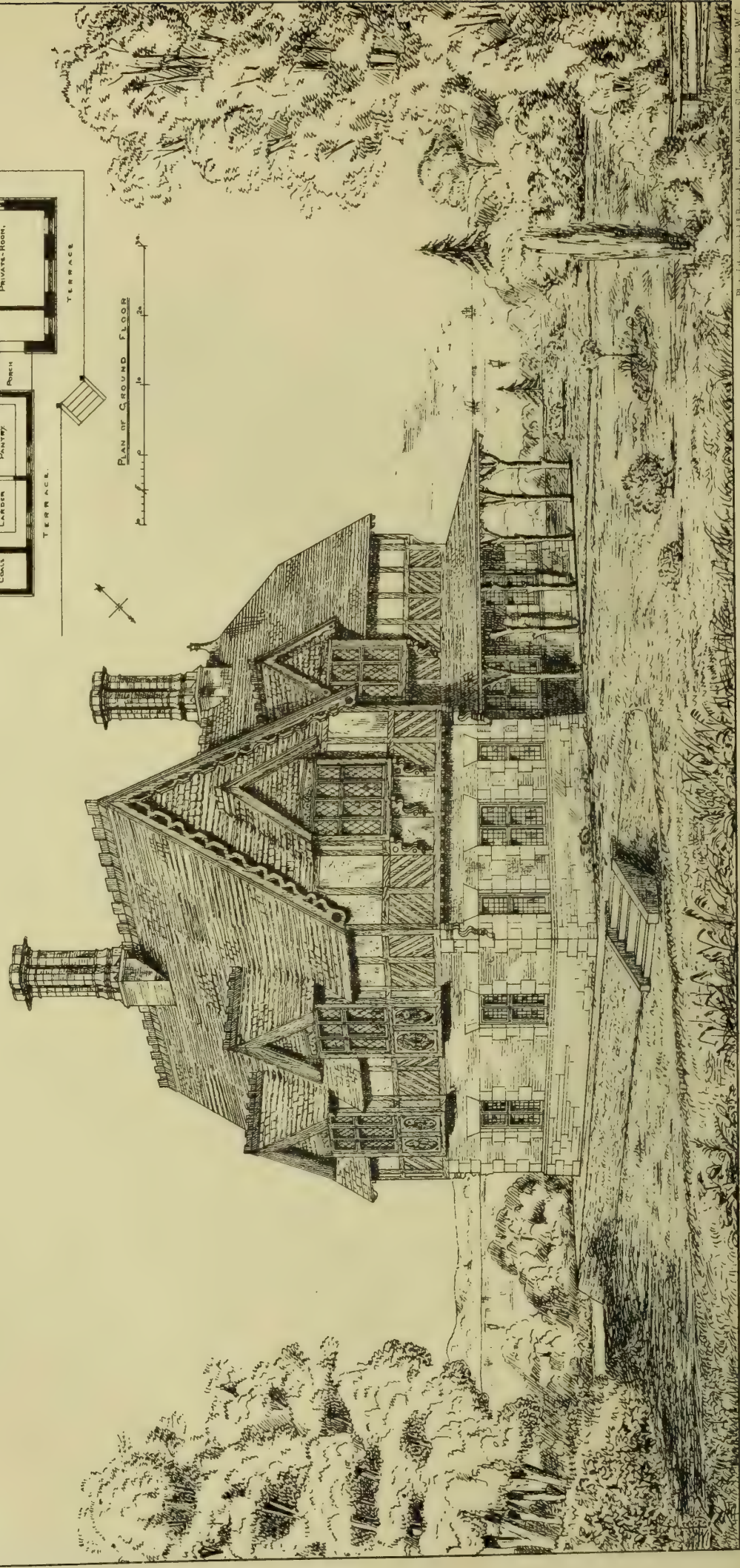


Photo. lithographed & printed by James Alderman 51, Gray's Inn Road, W.C.

— SHOOTING - LODGE - RECENTLY - ERECTED AT SANDRINGHAM —





COTEHELE HOUSE CORNWALL





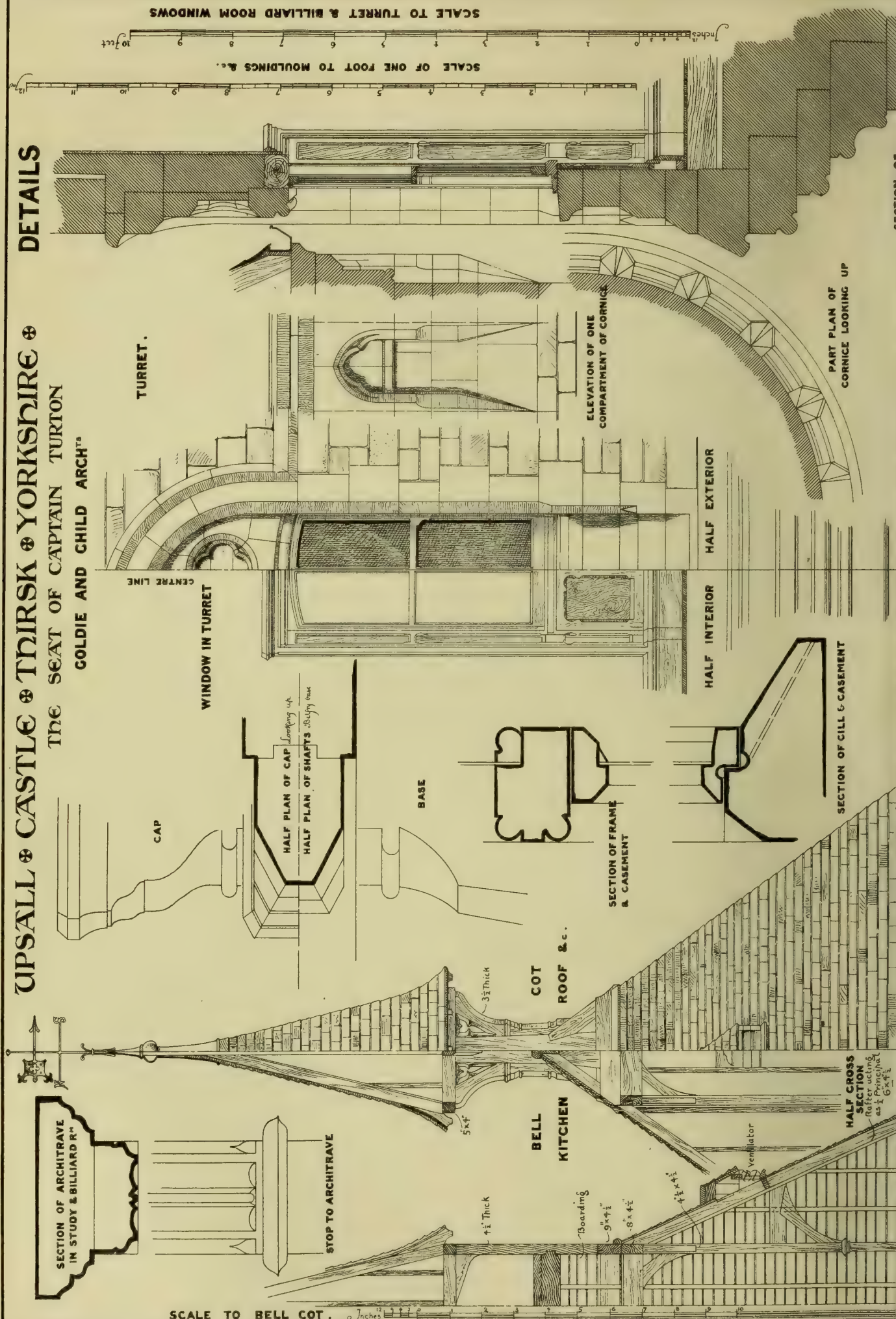




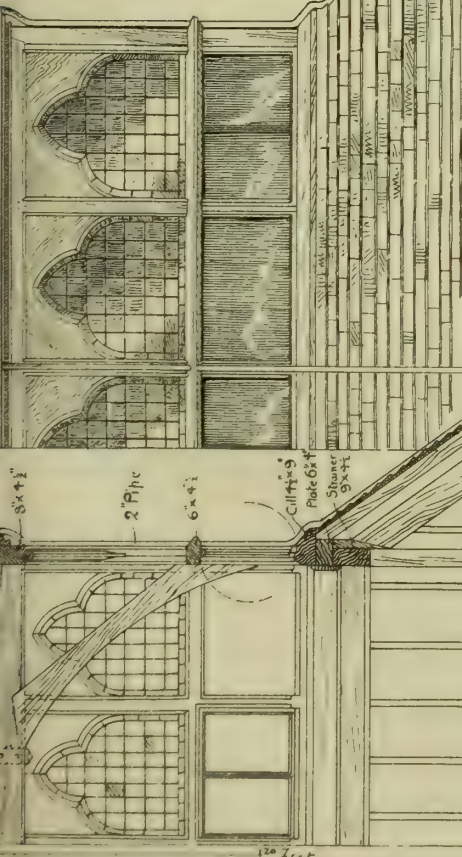


UPSALL & CASTLE & THIRSK & YORKSHIRE  
THE SEAT OF CAPTAIN TURTON  
GOLDIE AND CHILD ARCHTS

DETAILS







BILLIARD ROOM WINDOWS

HALF PLAN OF WINDOW

CENTRE LINE

1/4 PLAN TEA ROOM

TEA ROOM

HALF SIDE ELEVATION

OUTSIDE

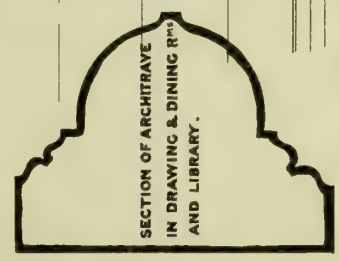
CENTRE LINE

SECTION

HALF LONGITUDINAL

SECTION OF

ARCHITRAVE



SECTION OF SKIRTING SHEWING ARCHITRAVE STOP IN BILLIARD ROOM

EXTERIOR

PLAN

INTERIOR

Looking Glass

SCALE OF FEET TO TEA ROOM







## VENTILATION OF SEWERS.

SEWER-VENTILATION stands in a pretty analogous position among engineers as the topic of warming and ventilation does with architects. They are ever-recurring topics, and subjects of much learned and unlearned dispute. Unfortunately for the discussion of these matters, there does not appear to be any common or neutral ground—no starting-point or settled opinion as a groundwork whereon to test the respective merits of theorists; and this is aggravated by the ignorance often manifested of a few simple hydrostatic or pneumatic laws. Thus, in warming and ventilation, we have frequent suggestions and countless patents taken out for warming by means of radiating grates and stoves without the necessary correlative—the maintenance of a circulation of air; and, again, we have ventilators for rooms, windows, doors, and walls in perplexing confusion thrust upon us as the panacea of infallible cure without provision of fresh air. Again, as regards sewers, the furnace or extraction-shaft idea, in its numerous forms, failed to take into account any kind or system of inlets for the supply of a current of air. The exhaustion of a shaft or a pipe was only thought of; the supply was neglected.

Mr. E. Ellice Clark, C.E., in a paper read before the Sanitary Association of Engineers at Birmingham, which has just been printed, contributes some important data to the already accumulated literature of the question to which we will briefly refer. Mr. Clark says, "By far the most effective system of ventilation yet adopted is the simple one of open gratings in the centre of the street." Deodorisation of the gases of sewers by charcoal and other disinfectants is pronounced impracticable, and this opinion we have for years entertained and share. Mr. Clark's own experience seems to have confirmed the opinion that no kind of charcoal tray, as that known as Latham's ventilator, answers any great length of time. He says he ventilated a sewer with the latter kind, the gradients varying from 1 in 400 to 1 in 15, the pipes being 18in., 15in., and 12in., and "though great care was taken in fixing the ventilators, especially on the steep gradients, after every heavy shower of rain I found the charcoal completely saturated, and several times covered with mud in wet weather; in dry weather the charcoal became consolidated by the traffic, and covered with fine dust." A month's use and the sewer became as foul as ever, and when the trays were removed and open gratings substituted, no complaint was heard, although before daily annoyance was felt during the summer months. These ventilating gratings are placed along the lower end of the sewer, which is 1 in 16, at varying distances of 125, 160, and 200ft. apart. In the next portion, with gradient of 1 in 60, two gratings 300ft. apart are fixed, "the end of sewer being connected by a 9-inch pipe with a furnace shaft 200ft. high." These means have, we are told, produced the best results, and as the effects of the furnace shaft may be interesting to our readers, we give the particulars. Temperature of sewer when outer air is 65° was 72°. Current produced by shaft close to junction, 4 miles an hour; 100yds. down sewer, current only 300yds. per hour; while close to the open grating, the draft was reversed, and through the grating. The objection to open street gratings, perhaps is, well founded in some cases where tide-locked outlets exist, or where the flow in the sewers is checked by being sewer-bound for a number of hours, the sewers getting full in the meantime; all gases evolved under these conditions must escape somewhere, and of course, if street gratings are provided they become the natural vents. Mr. Clark does not say anything about this condition of sewer, though it materially alters the case. Now the advantages of a system of house ventilators with the open gratings, combine, we believe, all that is required. Mr. Clark says sewer gas will not climb tortuous and small passages without pressure. This is true, but if that pressure is supplied either by artificial means, as he proposes, or simply by street gratings, what will be the effect? It will be this: the open gratings and shafts from streets will act as downcast shafts, and the house soil or other drain pipes as upcast shafts. Mr. Clark, indeed, admits the latter pipes will rarely, if ever, act as downcast pipes; but if the heavier atmospheric pressure is brought to bear through the street and lower level openings of sewers, the upward current in the house pipes must be established. The maximum

flow in most sewers is from 10.30 a.m. to 2.30 p.m. Mr. Clark's idea to introduce atmospheric air into the sewers is a good one, and may be adopted in many cases. The plan proposes to connect the sewer with a tall pipe, capped by a cowl-head, which would always present its opening to the wind instead of, as usual, against it; and thereby a large quantity of air would be driven down and overcome the sewer gas; its natural density would indeed aid this. If the temperature of air in the sewer and shaft was below that of the outer air, the current would be reversed, or the air in shaft would sink to level of the lower opening of sewer by its specific gravity, and the current be created to the lower opening. As to the pressure of sewer gas, the greatest that has been registered, we are told, has been 0.10 of an ounce to the square foot. This fact, and the meteorological returns of the pressure of wind, show that, with one end of a sewer attached to such an inlet, with another opening at the street level, a considerable current of air would be established and kept up, thus driving out the sewer gas as fast as it could arise. We are inclined to think, however, such aid could be dispensed with if sufficient openings were made in the lowest levels of a sewer, and a constant discharge of gas be allowed by outlets fixed in all house drains and soil pipes entering the sewer. The gas would be continuously discharging, and a complete current of air kept up in the sewer.

We believe the system of open street-gratings is beginning to find favour again among sanitary engineers, and we believe many of our engineers are favourable to them; but without such means of ventilation as suggested, they must be more doubtful than beneficial. Where the fall of sewer is great, and the end of each tributary main is connected with a street-grate, and the man-holes also open to the sewer, as in the case of Blackburn and other large towns, no artificial means are needed, as a constant current can be maintained. At Ramsgate, in the Queen-street sewer, which is tide-locked, where there was an amount of deposit, a current opposite the water-flow of 1 mile 110 yards in the hour was observed; the sewer is ventilated at its upper end. A current of a quarter of a mile an hour Mr. Clark thinks sufficient to prevent the gases accumulating to a dangerous degree. The summary of practical opinion which Mr. Clark has given us will be useful, though hardly sufficient data has been obtained with the replies to the questions asked. Charcoal, in the majority of instances, has been abandoned, owing to the difficulty of keeping it dry and free from dust. At Bacup a sewer 3ft. by 2ft. and 30in. by 20in., about 500 yards long each, has been ventilated with Latham's charcoal ventilators, "and the sewer is comparatively free from gas;" we have no other data. Bradford adopts vertical pipe-shafts and open gratings in the street, and a shaft 50ft. high for ventilation. We are not told the result. At Birkenhead ventilators with charcoal are used 60 to 120 yards apart. At Barnsley Brooke's patent, placed at every 100 yards at highest level, are adopted, with good results.

Bolton is adopting open gratings 100 yards apart. In Birmingham open shafts and down-spouts are used. Coventry uses 17 engine-stacks and 1,230 down-spouts from houses. Down-spouts are also used at Chelmsford; also at Ealing, where "charcoal in baskets ten to the mile is adopted. Huddersfield adopts Brooke's charcoal ventilators, but the trouble of attendance is objected to. Hartlepool ventilates by rain-pipes. In Leeds the gully-grates are in operation (10,000 of them). Other places—Sheffield, Stockton-on-Tees, Nottingham—depend on the open manholes and street-grates or down-pipes; Plymouth adopts flues carried up into house-chimneys. But these are rather scattered incoherent facts: we require results. These, however, are better than mere opinion. In Southampton, we may add, the engineer (Mr. Lemon) is in favour of street gratings, and when combined with other means of escape or outlet, we believe they may be turned to useful account.

## THE METROPOLITAN BUILDING ACT.

THE Select Committee to whom the Metropolitan Buildings and Management Bill was referred, have agreed to the following special report:—

Your committee have taken evidence in support of and against the Bill referred to them, and have received much valuable information on the subject. Your committee have arrived at certain

conclusions, respecting several important provisions of the Bill, and have expressed the same in the following resolutions.

1. That it is not desirable to fix any limit as to the height of buildings in new streets above 50ft. wide.

2. That it is not desirable to fix any limit as to cubical contents in buildings other than warehouses.

3. That where a building is used partly as a store for goods, and partly as a shop for selling goods by retail, the portions used for storing goods be regarded as a warehouse, and should be subject to the limitations as to cubical contents provided in this bill.

4. That with regard to district surveyors their status should remain the same as under the former Acts of Parliament, the power of appointment, suspension, or dismissal resting with the Metropolitan Board of Works, but the board shall have the power to institute proceedings before a magistrate in regard to any question of dispute arising between a district surveyor and a builder and owner of property, or in regard to any matter connected with the discharge of the duties of the district surveyor, in which they think the public interest is involved.

5. That the district surveyor or the Metropolitan Board shall have full power to stop the progress of any building in which the materials or construction is calculated to be dangerous or injurious to health, and to summon the builder or owner before the magistrate.

6. That the schedules to the Bill and the provisions to be proposed to be carried out by by-laws ought, as far as practicable, to be incorporated in the Bill itself.

Your committee also express the opinion:—

1st. That any power to be conferred on the Metropolitan Board, of modifying the restrictions contained in the Bill, should be provided in a separate clause, which should prescribe the cases to which that power should be limited.

2nd. That it is not desirable to alter the language of the existing Act in any case in which the necessity of an alteration has not been demonstrated by experience.

Your committee communicated these resolutions and their opinion to the promoters of the Bill, and desired to know whether they would submit to them a draft Bill framed in accordance with the said resolutions and opinion. The promoters of the Bill not being prepared to adopt this course, your committee are of opinion that the Bill should not pass into law.

ROYAL ARCHÆOLOGICAL INSTITUTE,  
RIPON MEETING, 1874.

(FROM OUR OWN REPORTER.)

THE annual meeting of the Royal Archæological Institute of Great Britain and Ireland commenced on July 21st, at Ripon, under exceedingly favourable conditions. Genial showers during the preceding night and early in the day put an end to the long drought and parching heat that had continued for many weeks before, making the idea of excursions along dusty roads distasteful. Nothing, therefore, could have been more opportune than this unlooked-for change. So the members of the Institute, the residents of the old city, and the numerous visitors, gathered together in the highest spirits, and with lively anticipations, in the assembly room of the Town Hall, where it was understood that the Mayor and Corporation were prepared to give a reception of welcome to the Institute. There, accordingly, the Mayor attended in his robes of office, supported by the Aldermen and Town Council, and preceded by the mace-bearer with the far-famed horn of Ripon. A short but fitting address was then read, bidding the Institute and the visitors generally a hearty welcome during their stay, and in noting the objects which it was thought would interest them, a shrewd suspicion was gently thrown out that the programme that had been prepared had struck the Corporation as being in one sense too extensive and in another hardly comprehensive enough—in other words, like a net of ambitious extent, but with meshes too wide, in that time was hardly given for the thorough examination of the very important archaeological objects in the vicinity, while others of interest were passed over. It is, however, impossible, in framing such expeditions, to attempt to exhaust the treasures of a locality, and as the address graciously concluded its stricture on this point, it left room for hope that a future opportunity might be found for



repeating the visit to make good unavoidable omissions on the present occasion. Lord Talbot de Malahide, as President of the Institute, replied that he was aware it required a long time to do full justice to the numerous and valuable works of antiquity of the locality, and though he could not take upon himself to promise at any rate a speedy recurrence of the present visitation, felt sure that the members would do their utmost to avail themselves worthily of the present, and thanked the Corporation for their kindly welcome. He congratulated the venerable city on what they had done in the way of preservation and judicious restoration of what they had inherited from the past, and that they had not acted as Goths and Vandals had done, in sacrificing what was old to make room for questionable modern improvements. Ignobly notable among such criminals stood the City of London, who had allowed one of the finest views of S. Paul's, that from Ludgate Hill, to be disfigured and obscured, and even now quite unnecessarily suffering the destruction of one of the last of the residences of the old nobles of England on the banks of the Thames, Northumberland House, to be swept away. He then, as head of the Institution, handed over the chairmanship of the local meeting to the Marquis of Ripon, who had been elected its President for the present occasion.

THE MARQUIS OF RIPON, taking the proffered chair, avowed that after consenting to do so under the supposition that he was only expected to have been an ornamental temporary head of the Society, he had been alarmed to find that he was required to be a useful one as well, and dreaded his incompetency for so onerous a task. However, he had bowed to authority, and, though tremblingly, had set himself, to the best of his ability, to fulfil the work imposed upon him. He had prepared an irregular address to deliver in the evening, in anticipation of which he should then confine himself to a simple but hearty welcoming of the Institute and the visitors in the capacity with which he had been so honourably endowed.

THE BISHOP OF RIPON then tendered a like greeting on behalf of the Dean and Chapter of Ripon, and stated that he thought the Institute had rightly chosen as their meeting place for this year a neighbourhood with which few could compete for the possession of so many objects of high archaeological interest.

Colonel PINNEY, on behalf of the members of the Institute, acknowledged the cordial welcomes they had been favoured with, and

Mr. THOMAS BROOKE, F.S.A., speaking for the Yorkshire Archaeological and Topographical Association, offered the same from that body, which hoped to receive guidance from the experience of the Institute, and referring to the manual which had been prepared under the direction of the Council of his Society, trusted it might be found, if not perfect, yet at least useful, in the course of the labours they were entering upon.

Mr. G. T. CLARK, in returning thanks to the Association, acknowledged that no other county of England was so richly endowed with what was glorious from the past, or had taken a nobler part in the best work of the present age; and that the production of such a manual as had been put into their hands by their Yorkshire friends was a proof of that enthusiasm which might be fitly described as zeal according to knowledge, but that he feared it needed the famed fleetness of Yorkshire steeds, and the endurance of Yorkshire men, to grasp and carry out the programme it set forth; as much, however, might be done by means of good drilling, he had no doubt, with the Marquis as General, and Mr. Fairless Barber as Sergeant-Major, they would be able to conquer even so formidable a task at last.

Certainly, the manual so humorously pointed to is quite unique, as a guide book prepared for such an occasion, and does the utmost credit to its compilers; and being liberally furnished with maps and plans of the district, places, and principal buildings to be visited, forms quite a goodly volume in itself.

After a few words from Mr. Barber, entreating attention to the discipline requisite to be enforced, in order to ensure order and success to the several excursions that had been proposed, the whole company proceeded to the spacious tent in which it was announced that the Mayor and Corporation had refreshments for their entertainment.

After the luncheon, which was upon a most liberal scale, had been discussed, and the usual speeches upon such an occasion given, the mem-

bers of the Institute and visitors repaired at once to the Cathedral, where Sir Gilbert Scott was awaiting them to describe its salient features. We have, in a recent volume, given a fuller account of this noble fabric, when the Yorkshire Archaeological Society visited it, than we can devote space for now; still we will endeavour to follow the lecturer as to the main points which he elucidated.

Ripon Minster stands on a fine eminence in the middle of the small though venerable city of which it is now the main ornament, since of the ancient Abbey of Ripon only the site is known, and that of Eata's Monastery is only a matter of supposition. Compared with other cathedrals, it is of very moderate size; but the plan is compact and regular. Like most of its compeers, it has grown up by degrees through several centuries, and consequently displays in its architecture all the various styles in their succession, some of them intermingled in curious fashion. The external outline of the building is dignified but not striking, in consequence of the loss of the timber spires which once capped the towers, which appear rather stunted without them. The plan is a simple Latin cross, with short nave and aisles, two western towers, well marked aisleless transept, with eastern chapels, and chancel nearly as long as the nave, with aisles, and only chapter-house and sacristy as adjuncts.

Sir Gilbert Scott took his stand first at the western end of the nave, whence he pointed out the evidences which exist to show the very unique character which the original nave possessed, and which must have somewhat resembled that which, on a smaller scale, is still extant at Nun-Monkton Church. The nave had, then, in the time of Roger, the founder, no aisles and three divisions in height internally, the lowest blank walling, then a sort of lofty triforium, arcaded and recessed, but probably not pierced with any windows, arranged in alternately wide and narrow bays, subdivided by shafts rising from the ground, and above, a clerestory, one of the peculiar lights of which remains. The main light which this curious interior received must have been from the western window, which preceded the noble ranges of lancet windows which now form the feature of the well-known magnificent Early English west front. These west windows, till the recent restoration, were subdivided with tracery of later date, the removal of which, though questionable in an archaeological sense, we cannot but approve in an architectural one, though we could wish they were to be filled more worthily than with the very poor and mediocre coloured pattern glass with which several of the lights have been occupied.

This work of Archbishop Roger, to which we have referred (A.D. 1154 to 1181), is not the oldest part of the fabric, as the well-known Saxon crypt under the tower, with its quaint S. Wilfrid's Needle, and a few fragments of Norman work—particularly the apsidal termination of the chapter-house, cannot be passed without mention. The undercroft to the chapter-house Sir Gilbert Scott refused to credit with the hoar antiquity usually attributed to it. The transepts retain, with but little subsequent modification, their fine Transitional work of Roger's time. The western towers which flank this nave are Early English, as the rest of the west front, and are noticeable for the stately buttresses at the angles which rise undiminished from the ground to the parapets with well-moulded angle-shafts, and cry out for work to do, in the shape of some adequate spires to support, in place of the poor parapets and pinnacles which now form a miserable termination to them. Then from the western end nearly to the crux, the side-walls had been removed to allow of the addition of the Perpendicular arcades and side-aisles; a work of bold conception and excellent character for its time. And at the crux, one only of Archbishop Roger's central piers is left to show his over-daring conception, since then slender bulk and too flat (semicircular) arches failed under the weight of this tower, which formed their superstructure, and rendered necessary the fine casing of the other three piers and the broad arches which surmount them. The organ-screen, worked in with the two eastern piers, is a well-designed and rich work of the same Perpendicular period, and the delicacy of its details deserves close examination. The organ still stands above this in its rightful position, and has not succumbed to the prevalent mistaken notion of getting a vista from end to end of the building, and which in this case would only have exposed its comparative shortness.

Sir Gilbert Scott then proceeded eastward, and described the curious transformations which the choir had undergone, and called special attention to the noble Decorated east window of seven lights and rich tracery; but rich as was the internal treatment of this portion, he stated that he preferred its exterior, and truly the eastern elevation of Ripon Cathedral, with its vast and stately buttresses rising grandly on the crown of the hill, is a truly noble work of the fourteenth century. Then Sir Gilbert Scott concluded his remarks, leaving the company, as we must our readers, to search out for themselves the many other beauties of the structure. Some of the party then wended their way to the library, where a short paper was read on its principal contents, many of which are most curious and valuable, and among which has been recently placed, through the munificence of the Marquis of Ripon, the unique Ripon psalter; and illustrations of some quaint and pleasing ancient music of Henry the Eighth's composition, recently discovered in the library, were then rendered by the cathedral choir, with remarks made by Mr. Crow.

From the cathedral Mr. Barber led the assembly to the adjoining deaunery, to inspect a curious series of Royal portraits, and thence to Ailey Hill, in the grounds of the canon's residence, a tumulus containing numerous bones, as to the nature and origin of which many speculations were made, the prevailing opinion appearing to be that it was British, and probably marked the site of some ancient and forgotten battlefield.

The chapel of S. Mary Magdalen was then visited, where there is a stone altar, marked with the usual five apses *in situ*; and also a remarkable tessellated pavement in front of it, which Mr. Parker described to be real Norman, and not, as has been usually supposed, of the date of the Italian pavement in Westminster Abbey, and elsewhere; but how and when it got into its present position remained an unsolved problem. The ruins of the Maison de Dieu were then inspected, but these as further information is promised to the Association before the close of the meeting, we shall defer noticing, and this concluded the work of the day, according to the programme, until the company re-assembled in the evening to receive the inaugural address of the President, before alluded to.

This address was delivered in the Riding-school in Park-street, and was fully attended and listened to with rapt attention. The Marquis at the outset said he would exercise the privilege which he felt he had a right to claim as one of the presidents of the Yorkshire Archaeological and Topographical Institution, and offer to the members of the Royal Archaeological Institute a word or two of welcome on behalf of their Yorkshire sister, on that their third visit to Yorkshire. He assured the members of the Royal Institute that they were always glad when the antiquities of Yorkshire proved sufficiently attractive to induce learned and distinguished societies like their own to come among them and to render what aid they could in the investigations in which the larger society in the United Kingdom, and the Yorkshire society on the more limited area of the country, were engaged. The Yorkshire Institute looked with sympathetic interest on the course the proceedings might take, and they would hail with satisfaction the publication with which, he trusted, they might be favoured of the Ripon volume of their proceedings. Such a volume, containing, the addresses and memoirs read at these meetings would be specially welcome to all who, like himself, were interested in Ripon and its neighbourhood. If they had not in their ancient but small city the attractions to be met with in the larger towns of the West Riding, they had at least a purer air and unpolluted streams, of which many of those towns were deprived, and the Institute would find, he trusted, in the programme prepared for them, sufficient attractions to compensate for minor inconveniences. He disclaimed any intention of ever attempting to give any historical or archaeological lecture, and he attributed his position in a considerable degree to his connection with Ripon, and his ownership of Fountains Abbey—that magnificent ruin which he held to be a priceless possession. Whatever service he or those who had preceded him had been able to do in exploring and preserving these remains, they had been to them a labour of love. He yielded to no man in his desire to preserve everything which might be of use in throwing light on the history of the past. A more important group of archaeological or varied interest they could not find than existed in that district. Re-



ferring to the examples in the locality of British, Roman, and English periods of archaeology, instancing particularly the traces of earthworks supposed to be of British origin in the neighbourhood, the President said that at Thornborough there was a remarkable series, the special characteristics of which he pointed out, and remarked that it would be interesting to have the period of these approximately ascertained. The Roman remains at Castle Dyke and the excavations made by the Rev. W. C. Luke, were next referred to, and the discovery of Roman appearances near Clothholme. Ripon was not so far from the site of the ancient Isurium, now Aldborough, as to have remained unaffected by that important station; and papers bearing on all these matters would be of great interest to the members. He suggested the compilation of a work bearing on all these earthworks, whether single or detached, and also a collection of accurate drawings of all inscribed and carved stones in what was known as Northumbria. Having referred to other local antiquities, and to the importance of preserving ancient monuments, he said he relied more upon a healthy public opinion than upon legislative measures for accomplishing these objects. He had only to remind them that they had four of the most interesting Cistercian houses to visit, and he could not but think that an opportunity which he believed to be unattainable elsewhere in England, was now afforded for such an examination of their architectural remains as might solve many vexed questions as to the uses to which the different apartments in these fabrics were originally put. He was sure it would be borne in mind that they were all the result of a deep religious movement, and Yorkshiresmen had always been peculiarly susceptible to influences of that kind. He was truly glad that attention had of late years been given to Fountains Abbey by the County Association, and that a visit of that Association in 1872 had incited their friend Mr. Sharpe to continue his researches with a determination to ascertain to what uses the separate apartments had been put. He believed Mr. Sharpe's designation of that part of the building in which he (the Marquis) hoped to have the honour of receiving the members of the Institute to-morrow would prove a principal subject of discussion during this meeting. He might be permitted to mention, as he hoped without presumption, an apparently small matter which had resulted from some recent explorations conducted by his orders at the Lady Chapel at Fountains. He had in this matter a somewhat parental interest. There had been uncovered there and would be opened for inspection to-morrow, the bases of no less than six altars, each of them furnished with a small drain or ground *piscina* at the south-west corner. Such an arrangement so treated in the absence of others had led to inquiries respecting them, and this question at the present moment had a peculiar and painful interest for the members of the Archaeological Institute, because it was the fact that the circumstances connected with the discovery were one of the latest subjects which engaged the attention of Sir Stephen Glynn, whose loss they all so seriously deplored. It was to him a question whether the investigation which was begun should not be pursued by removing the structure which was raised and existed now immediately within the east window in the hope of discovering the remaining three of the nine altars which had given their names to the chapel. Some persons might think it rather a sacrilegious act on his part to interfere with what had been done by his predecessors, but he should like to say to all comers that in doing what he was carrying out he was simply acting on the orders of the Royal Archaeological Institute. He could only add that in whatever direction the taste of any individual archaeologist amongst them might lead him to turn, he was sure he would find something to engage his attention upon his own particular subject. As to the trade guilds of Ripon, to which allusion was made in the morning in the address of his noble friend, the real President of the Society, all traces of those guilds were not lost, and the White Book of the corporation, though not very ancient, contained traces of them which would be open to members in the hands of the town clerk, and would, he thought, prove well worthy of their examination. After a reference to the loss sustained by the Society recently through the decease of several distinguished members, his lordship concluded by again welcoming the Institute to Ripon.—Lord Talbot de Malahide proposed that the thanks of the Institute be given to the President of the meeting for

the able and interesting address he had delivered.—The Bishop of Ripon having seconded the proposition, it was carried with acclamation. On Wednesday, after a formal meeting of the sections at ten o'clock, Mr. Edmund Sharpe, M.A., F.R.I.B.A., lectured in the Riding-school on Cistercian Abbeys generally to a large audience, but dwelt particularly on the great reformation effected in the Church of Rome during the twelfth century by S. Bernard and the Cistercians, who set themselves to show, by the force of their example and practice, that purity and holiness of living were not incompatible with a life of labour and seclusion. In secluded valleys you may find their houses, for, unlike the Benedictines, from whom they seceded, they sought not the haunts of man. They were iconoclasts, for they allowed no richly-sculptured reredos in their churches, and forbade any part of the human figure to be carved within the precincts of their houses. Stained-glass windows were only permitted where the churches had seceded to them from another order. For them in their days of simplicity no lofty tower raised its pinnacled front to heaven; a humble wooden belfry was ordained for their use, and to this they adhered until the order began to loosen the strictness of their rules, and then the lofty towers of Fountains and other kindred abbeys were erected. The Reformation followed, and the 3,200 dependencies of the Abbot of Cîteaux had to be reformed in their turn, and in England were reformed altogether. Yet within 200 years of the establishment of the Convent of Cîteaux in 1098 no less than 1,200 abbeys were founded, erected, and endowed. Yorkshire is particularly rich in the remains of these abbeys. Fountains, Bylands, Jervaulx, and Rievaulx are included within the scope of the Institute's excursions; and Kirkstall is so near that it will probably be visited by numbers of the archaeologists before they depart for their homes. Mr. Sharpe exhibited a number of excellent plans of the principal Cistercian abbeys of Europe, and also a "model" plan which has been reproduced in the very excellent manual of the Ripon meeting, presented by the council of the Yorkshire Archaeological and Topographical Association to every member and Associate of the Institute attending the congress. In the evening a conversation was held in the museum. Yesterday, after an early meeting for business purposes, there was an excursion to Eastby Abbey and Richmond, where the party were entertained by the Mayor of Richmond. In the evening the Marchioness of Ripon held a reception at the Studley Royal. Excursions are arranged for to-day, to-morrow, and Monday. The concluding meeting will be held on Tuesday, the 28th inst., and on Wednesday there will be a special visit to York. The presidents of sections are:—Antiquities, Mr. G. T. Clark, F.S.A.; Architecture, Mr. A. J. B. Beresford Hope, M.P., F.S.A.; History, the Rev. W. Stubbs, Regius Professor of Modern History, Oxford. The Rev. W. C. Lukis, F.S.A., is director of the museum, and Mr. Joseph Burtt (Assistant-keeper of the public records) and Mr. C. Drury E. Fortnum, F.S.A., are hon. secretaries of the meeting.

#### ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETIES.

**RUSSIAN ARCHÆOLOGICAL CONGRESS.**—The *Eastern Budget* states that the third Russian Archaeological Congress is to meet at Kieff on the 14th of August, and will sit about three weeks. The first was held at Moscow in 1868, the second at St. Petersburg in 1871, and Kieff, on account of its important historical monuments, has been worthily chosen as the seat of the third. An exhibition of Russian and Slavonic antiquities is to be open during the period of the congress, and it will probably be an extensive one, as many learned bodies have promised to send objects for the Exhibition. Several pre-historic funeral mounds (*kourhany*) in the neighbourhood of Kieff will be opened, and excursions along the banks of the Dnieper are being organised.

**WARWICKSHIRE FIELD CLUB.**—On Monday week the members of the Warwickshire Field Club met for their annual archaeological excursion, under the guidance of Mr. J. Tom Burgess, of Leamington. Starting from Claverden, where the Stonehouse, an old Elizabethan mansion, was visited, Claverden Leys and Yarningale were reached, and next the almost impenetrable wood which hides the great camp of Barmoor. The manor-house of Preston Bagot was subsequently inspected on the way to Henley, which was the next halting place.

## Civil Engineering.

### REPLACING A STONE PIER ON A PILE FOUNDATION.\*

THE stone piers for the bridge of the Massachusetts Central Railroad, over the Connecticut river at Northampton, Massachusetts, rest upon a timber foundation, consisting of piles and grillage. The piles were cut off 2ft. above the bed of the river. The grillage, consisting of three courses of 12in. timber, was placed in position over the piling, and the masonry commenced, being lowered as the work progressed, by means of screws, in the ordinary way, until the grillage rested upon the piles. The grillage for pier No. 8 was prepared on the shore during the winter of 1872-3, and, after a canal was cut through the ice, it was floated into position sometime in January, and the construction of the masonry at once entered upon. The work proceeded with proper despatch and with no drawbacks until two courses of stone were laid, 2ft. thick each, when suddenly the screws let go their hold upon the grillage, and the entire work disappeared in about 18ft. of water.

The false works and various obstructions in the river caused the formation of whirls and counter-currents. A careful study of the cause of this mishap led to the belief that the ice which had been cut out for the canal and at the site of the pier, and which, as the easiest way of getting rid of it, was shoved under the stationary ice, had been taken up by these whirls and thrown against the grillage with sufficient force to bruise and weaken the horns to which the screws were attached, which conclusion was confirmed by the subsequent examinations of a diver. Operations on this pier were then suspended until the season of low water, in the summer of 1873.

A careful examination showed that the masonry had not changed its position on the grillage, nor had it sustained any injury. The grillage rested upon the piling very nearly in its proper position, up and down stream; but in its descent it had moved easterly, so that its upper end was about 13in. out of place, and its lower end about 14in. The question then arose between the contractor, Mr. Smith, of Springfield, and the company's engineer, Mr. Frost, of Boston, as to whether to proceed with the work and finish the pier in that position, or to move it to the position in which it was first intended to place it. It was finally decided to leave the matter to referees, of whom the writer was one. The referees met, and it was determined to let it remain where it was, if, after thorough investigation, it was found that the grillage rested upon a sufficient number of piles to support the structure—providing the piles were properly distributed.

A diver was procured and a complete survey made, which resulted in the referees ordering the grillage and masonry to be moved into the position first intended for it. This decision having been arrived at, it became a question whether it would be more expedient to take up the entire work and commence anew, or to endeavour to move it bodily into position. The latter course was determined upon, after discussing various methods for accomplishing the object.

A plan was adopted, the details of which were worked out by Mr. Smith, and, on September 10th, the mass was moved successfully into place in seven hours. The pier is 12ft. 6in. wide, and 42ft. 7in. long on the bottom, and when moved was 4ft. high, resting on a grillage 3ft. thick, making a total height of 7ft., against which was quite a strong current, striking it obliquely at an angle of about 35°.

The method employed was substantially as follows: A framework of piles, heavily capped, one side of which was 3in. higher than the other, to facilitate the movement of the rollers, was first constructed around the pier. Across this, and over the pier, were placed timbers, in pairs, equal in number to the number of screws employed. Above each of these pairs was a single stick of timber, from which the screws for lifting the pier depended, the screws passing down between the two timbers first mentioned. Between the sticks of timber in pairs and the single stick was a set of rollers, and between the rollers and the timber were iron plates. Other timbers, to which was fastened railroad iron to strengthen them, and at the same time to counterbalance the buoyancy of

\* A Paper by J. ALBERT MONROE, C.E., Member of the American Society of Civil Engineers. Read March 4th, 1874.



the water (which it was necessary to do in order to facilitate the handling of them under water), were placed by a diver under the grillage, and between the rows of piling. The screws were attached to these timbers by means of yokes. When the preparations were completed the screws were turned until the grillage cleared the piling, when, by means of the ordinary iron clamps used in the construction of bridges and similar work, the pier was moved into place.

The principal feature of this operation is that it was accomplished without the aid of any tools or material other than such as were at hand and on the work, excepting the diving apparatus, which was necessary in order to get the timber under the grillage. The framework and screws were the same as employed in lowering the masonry of all the piers; the timber used under the grillage, and that used in connection with the rollers was procured for the floor-beams of the bridge.

#### PARLIAMENTARY NOTES.

**CHELSEA BRIDGE AND BATTERSEA PARK.** In reply to Sir C. Dilke, Lord H. Lennox stated, on Thursday week, that his attention had been called to the subject of freeing from toll the Government bridge leading to Battersea Park; but, as the hon. baronet was no doubt aware, there were difficulties in the way of carrying the proposal into effect. He could only express a hope that those difficulties might not be insuperable. He should be happy to enter into a discussion with the Chairman of the Metropolitan Board of Works on the subject, if the Board was disposed to approach it. On reference to the estimates, the hon. baronet would find that a sum had been taken for planting the vacant space within and on the west side of Battersea Park.

#### BOOKS RECEIVED.

*The Complete Measurer*, by RICHARD HORTON (London: Lockwood and Co.) has reached a second edition. The author's original principal reason for the compilation of the work was to afford an opportunity for the introduction to general usage of a more correct and convenient system of measuring timber, stone, &c. That the opportunity still exists, most users of building materials will admit; and even those who are wedded to the less perfect systems in general use, will find much valuable information in Mr. Horton's book.—*The Civil Service Handbook of English Literature*, by H. A. DOBSON (London: Lockwood), traces the rise and progress of the English language and literature. A concise and chronological account of the principal English authors is given, and in most instances short biographies are appended. A Dictionary Appendix is added, and some interesting Extracts are printed at the end of the volume, exhibiting the condition of the English language at various periods from A.D. 600, to the time of Milton and his contemporaries.—*The Theory of Arches*, by Professor W. ALLAN (New York: D. Van Nostrand) is one of Van Nostrand's Scientific Series, in the issue of which that publisher is doing for the Americans what Messrs. Longmans and Lockwood have so well done for us here. The treatise is an amplification and explanation of Professor Rankine's Chapters on the subject with which most of our readers are familiar.—*Answers to Easy Exercises in Arithmetic* (London: Longmans) is the key to the Rev. James Harris' Manual.

**A VERY SIMPLE PANTAGRAPH.**—Schnaus suggests the use of a fine rubber cord, about 15in. long, supplied with a loop at each end, and having on it a small white bead, sliding upon it with gentle friction. By securing one end to the table by a pin, and passing a pencil through the other end, and drawing its point over the paper with the right hand, keeping the string stretched, and causing the bead to describe the outline of a simple drawing placed beneath it, a tolerably good copy of the drawing will be produced, bearing any desired proportion to the original, according to the position given to the bead on the string; thus, if the bead is in the centre of the cord, the drawing will be double the size of the original. The best results are only obtainable after some practice, and by employing a finer point than a bead.

## Building Intelligence.

#### CHURCHES AND CHAPELS.

**ELPHIN.**—On Sunday next, the new (Roman) Catholic Cathedral, of Sligo, for the diocese of Elphin, will be consecrated. The foundation-stone was laid in August, 1867, and it will have been finished and consecrated within seven years, at a cost of £40,000. The cathedral, designed by Mr. Goldie, of the firm of Goldie and Child, London, is in the Norman style, and measures, from the chief entrance doors under the tower to the extreme end of the apse, where the Lady Chapel is to be erected, 225ft. Its internal breadth is 65ft., and, including the transepts, 115ft. The height from the floor to the roof is 62ft., and from the floor to the ridge 86ft. The nave is 33ft. wide, and each aisle 15½ft. The cathedral can seat 6,000 persons.

**HEDGE END.**—On Wednesday week the new church of S. John, Hedge End, South Hants, was consecrated. The church has been designed by Mr. Colson, architect, of Winchester, and built by Mr. T. R. White, of Southsea. Built to comfortably accommodate about 250 persons, it consists of a nave, south transept, and chancel, with organ-chamber within it, the lower part of the tower forming the vestry. It is of the Early Decorated style, and the exterior is faced with Swanage stone and Bath stone dressings to the windows. The seats are open, and are of stained deal; the passages are paved with red and black tiles, and the chancel with Maw's encaustic tiles. The pulpit and font are of carved Caen stone, supported by rouge-royal columns. The chancel-arch of stone is supported by polished Purbeck marble columns, with carved bosses.

**HYTHE.**—On Thursday week, the new church of S. John, Hythe, was consecrated. The building, of which Mr. Scott, son of Sir Gilbert Scott, is the architect, and Mr. J. Martell, of Hythe, the builder, the latter gentleman being, it is interesting to note, the son of the builder of the old place of worship, is in the Early English style, and is intended for the use of at least 500 persons, the estimated cost being about £5,000. The interior consists of a nave and chancel with side aisle; the exterior is of red brick, with Bath stone dressings, and there is a bell-turret, with two smaller stone turrets at the east end.

**INCORPORATED SOCIETY FOR PROMOTING THE ENLARGEMENT OF CHURCHES.**—The Society held its last meeting for the present session (and till November) on Monday. Grants of money amounting to £3,310 were made in aid of building new churches at Chilton Moor, parish of Houghton-le-Spring, Fence Houses; Howle-hill, parish of Walford, Ross; Little Hulton, Bolton-le-Moors; Kingston Blount, parish of Aston Rowant, Tetsworth; Kingston-hill, S. Paul, parish of Kingston-on-Thames; Mill-end, parish of Rickmansworth; Newington, S. Andrew, Surrey; Newington, S. Agnes, Surrey; and Stanley parish of Crook, Darlington; rebuilding the churches at Harby, near Lincoln; Llanfor, near Bala; Manca, near Ely; and York S. Maurice; enlarging or otherwise increasing the accommodation in the churches at Battersea, S. George, Surrey; Blewbury, Didcot; Brabourne, Ashford; Bracebridge, Lincoln; Bradwell, Great Yarmouth; Bruton, Somerset; Fowey, Cornwall; Grafton Flyford, near Worcester; Great Kimble, Tring; Great Gonerby, Grantham; Great Waltham, Colchester; Harby, Melton Mowbray; Hawkinge, near Folkestone; Highgate, All Saints', Middlesex; High Wycombe, Bucks; Hughenden, near High Wycombe; Hythe Parish Church, Trent; Kentisbury, near Barnstaple; Morcott, near Uppingham; Llanfair Talhain, Abergele; Marloes, Milford Haven; Morebath, Tiverton; Neston, Chester; North-end, Christ Church, parish of Finchley, Middlesex; Rotherfield Peppard, near Henley-on-Thames; Saxby, near Melton Mowbray; Stafford, S. Chad; S. Pierre, near Chepstow; Tudeley, near Tunbridge; West Farleigh, near Maidstone; and Windlesham, near Farnborough Station. Under urgent circumstances the grants formerly made towards rebuilding the churches at Brighton, S. James, and Welland, near Upton-on-Severn; towards building the Mission Church at Camberwell, S. Luke's, Surrey; and towards reseating and restoring the church at Teabury, Wilts, were each increased. Grants were also made from the School, Church, and Mission-house Fund towards

building school or mission churches at Gatley, near Stockport; Upper Holloway, S. John's, Middlesex; Kensington, S. Clement's, Middlesex; and Woodside, parish of Cinderford, near Newnham. The Society likewise accepted the trust of a sum of money as a repair fund for All Saints' Church, Robert Town, York. Since the commencement of the Society's financial year (April), the sums voted amount to £7,755, whilst the receipts during the same time have been but £3,688, leaving a deficiency of £4,617.

**KENT.**—It is proposed to restore the interesting church at Hever, Kent, at a cost of £1,500, or, including the restoration of the spire, £1,700. The rector writes that in the storm of Saturday week this spire (one of shingle), which is as symmetrical as any in Kent, was rent from summit to base by the lightning.

#### BUILDINGS.

**BRADFORD.**—Last week the new S. James's Wholesale Vegetable, Fruit, and Fish Markets were opened. The cost of the buildings, exclusive of paving, has been £14,000. Messrs. Lockwood and Mawson are the architects, and Mr. Wilson the clerk of the works. A clock-tower is placed at one angle of the market.

#### SCHOOLS.

**ECCLESHILL.**—On Saturday afternoon a new Board-school was opened on the borders of Undercliffe, for the Ecclehill School Board. The schools provide accommodation for 315 children, and the estimated cost of the buildings is £2,800, or a little over £9 per head. Mr. John Kay, of Leeds and Idle, is the architect, and the works were carried out in branches by various local contractors.

**HALIFAX.**—Two new Board schools were opened at Halifax on Monday. The Queen's-road schools are in the Italian style, freely treated, and include a main building and two wings. In the south wing is the girls' school. It is 50ft. long by 25ft. wide, with three spacious classrooms, besides lavatory and cloakroom attached. The infant school, in the centre of the block, is 53ft. by 27ft., and has four classrooms. The boys' school, forming the north wing, is 50ft. by 25ft., and has three classrooms, lavatory, and cloakroom attached. The cost of the building, including land, has been £10,500. Accommodation is provided for 750 children. Messrs. Horsfall, Wardle, and Patchett, of Halifax, have been the architects, Mr. Williams having superintended the erection. The Booth Town Schools, a less pretentious building, have cost about £5,400. They will accommodate about 500 scholars. Messrs. Leeming and Leeming, of Halifax, are the architects.

#### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

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Front Page Advertisements 9d. per line. Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

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SETTLER (Your query is an advertisement in disguise).—ALFRED (Very likely you could sell your volumes if you specified them in an advertisement).—A. A. (Such a letter should be authenticated).—WILLIAM CAVE, Western-Super-Mare (It is contrary to our custom to insert letters correcting the blunders of other professional papers, and particularly the blunders of the paper referred to by you).

## Correspondence.

DR. ZERFFI AND GOTHIC, ANCIENT AND MODERN.

(To the Editor of the BUILDING NEWS.)

SIR,—In this over-worked, jaded age, one is grateful for the mental stimulus afforded by reading Dr. Zerffi's thoughtful and picturesque Art studies. Speech is necessary to Art now and then; and your correspondent has eloquently and learnedly written on subjects which touch the familiar thoughts and pursuits of an architect's daily life. Dr. Zerffi has had his say, and I trust he will bear with me while I venture to call in question the accuracy of his conclusions, where they relate to the character, aims, and hopes of the revived Gothic of to-day.

According to your contributor, an historical review of the past triumphs of Gothic Architecture should lead one to the following conclusions, given verbatim, to ensure accuracy of representations:—"If the variety of symbolic and allegoric ornamentation, the statuary representing the twelve months and the twelve apostles, the seven deadly sins, the five wounds of Christ, the scenes from natural history, the heathen philosophers, the prophets and sybils, be once removed, Gothic Art sinks into insignificance." There is little in this category which could not be fitly introduced in a new Gothic church, if the consecrating Bishops would allow of it; but in order to test the accuracy of such a judgment on the architecture of ancient buildings, I turn for a moment to the most familiar and best known examples at hand; those, in fact, which should be the standard of all English modern Gothic, I mean the Mediæval churches of our own land, which, for the sake of argument, we will assume to be Gothic. Your readers will agree with me that scarcely one out of every hundred has, or has had, any sculpture at all; while not one of them, including our cathedrals, will in any degree respond to Dr. Zerffi's description. As for the heathen philosophers and sybils, I have seen them on the façade of an Italian Renaissance church, but even there I failed to perceive the propriety of their position.

The next sentence appears to me to be an indictment against ancient and modern Gothic architects all round. It is as follows:—"If our modern Gothicists cannot give us back the blind fanaticism of faith, the ignorance of the laws of nature, the horned devil, with his tail and fiery tongue, the wealth of an omnipotent hierarchy; they must not attempt to construct mean buildings which they are pleased to christen Gothic."

It is unkind of Dr. Zerffi to write in so severe a strain, and to agitate one thus in this hot weather! One's first thought, on perusing this startling piece of criticism, is of the entire congeniality and peculiar fitness of the soil of Ireland for displaying an architecture in which all the above-mentioned qualities could be fully incorporated; a country where one would stand little risk of confronting modern sweetness and light.

"There, methinks, would be enjoyment, more than in this march of mind,  
In the steamship, in the railway, in the thoughts  
that shake mankind," &c.

But, seriously, if this were a true definition of the Gothic of the past, one might more resignedly accept its humiliating conclusion:

"For who would keep an ancient form  
Through which the spirit breathes no more?"

But, believing it to be both inapt and narrow, I venture to enter my protest.

It is rarely one meets with so eloquent a glorification of human weakness, superstition, and darkness. One had been innocently taught to

look upon a Gothic church as representing Christian adoration, beautifully expressed, and it had never entered my mind to associate their loved and venerable walls with "blind fanaticism," "ignorance," and "horned devils," a very lump of compounded naughtiness. The influence of religion upon the brooding mind of the Mediæval artist I can well understand, but how can "blind fanaticism" be clothed in architectural forms? To be sure, I have seen the chapel of "Saint" Peter Martyr at Milan, built to the honour of that eminent blind fanatic of the miserable Inquisition, but its walls are adorned with heavenly visions of lovely angels, playing on bells, and singing welcoming songs to saints entering Paradise.

Then, as to this required "ignorance of the laws of human nature," the carver of to-day will not put his head in a bag for consistency's sake; and what can it matter if he knows a little more botany, or geology, or astronomy, than his elder brother? for after all, he can only carve the eye's impression of natural objects, stiffened and conventionalised into art forms. With regard to the "horned devil," I am afraid clients would not have him at any price, in spite of his attractive tail and tongue. But the "hierarchy of angels" is another matter. Every architect is, with Mr. Disraeli, on the side of the angels, albeit they are only the messengers of the All-powerful, and have not themselves the divine attribute of omnipotency assumed by Dr. Zerffi.

In conclusion, I would say that the statement as to the utter extinction of Gothic art and religious faith—both lovely and undivided in Mediæval times—is an assumption which your correspondent would find it difficult to prove. We yet prefix our dates with "Anno Domini," and though it be the nineteenth century, yet God's arm is not shortened in the kingdom of grace; nor in the realm of art is the old fount of Gothic inspiration yet exhausted. The English Churchmen of to-day have both an art and a creed to express in their religious edifices, though the Bishops and the British House of Commons mean to rob us of our ritual.\*

Modern Gothic architecture has achieved many noble things, and is steadily advancing in freedom and power. It is, then, both unfair and ungenerous for an art-critic of Dr. Zerffi's rank to unearth an old knock-me-down, piled-up piece of denunciation, from an old book by Mr. Ruskin, which might fitly describe his loathing for the art of the period when it was penned, but which is a most inapt description of that of the present time. I deny that "our art" is a "mock imitation," or a "crying falsehood," or that "its results are wasted, unsubstantial, cramped, poor, miserable, and petty buildings, neatly labelled Gothic."—I am, Sir, &c.,

Bristol.

JOHN D. SEDDING.

## GASES IN SEWERS.

SIR,—Will you permit me to make a few remarks on the article headed as above in your issue of Friday last? You say that I point to the harmlessness of nitrogen in sewers, and continue:—"But this does not, we think, show the utility of ventilation, or its comparative uselessness." That is so. In the paper read before the Sanitary Engineers no such deduction was drawn. On the contrary, open ventilation was advocated, with certain modifications. Again, you seem to think that I urged flushing as against ventilation. Nothing could be more erroneous. What I said was this:—"I am strongly of opinion that careful attention to the flushing of sewers—even though they may be badly constructed and ventilated—will effect a large diminution in the volume of dangerous gases in such sewers." I never for one moment could advocate any theory that ventilation was not more efficacious than flushing. Any practical man having paid attention to this question can come to no other conclusion than that sewers, working under a system where ventilation is subsidiary to flushing, must be foul: I am now speaking of small pipe sewers, especially of steep grades. In large, egg-shaped sewers of constant current there is very little dangerous gas, the solubility of its constituents being so great that the flow of water of itself absorbs the gas.

Supposing only nitrogen and oxygen existed in sewers, we should require no ventilation at all. To sum up in a few words the solution of the problem of sewer ventilation: Get as much water of a low temperature as possible into the sewers,

\* The last portion of this sentence is unadulterated exaggeration.—Ed.

and make all the openings you can for the admission of atmospheric air from the streets.

Ramsgate.

E. ELLICE-CLARK.

## TAKING OUT QUANTITIES.

SIR,—Having been absent from home since the late Conference of Architects, I have only just seen your report on the employment of surveyors. As the remarks which I made on the subject seem to have been misunderstood, perhaps you would kindly insert a few lines showing what I said.

I mentioned that in Ireland architects never take out their own quantities; they are taken out for large works by two surveyors. In smaller works one surveyor's quantities are often accepted by builders tendering as correct, or they take out their own quantities.

The quantities never form a part of the contract. No client, whether a public body or a private individual, would be satisfied with a contract unless its amount were defined and unalterable. The prices attached to the quantities form a schedule of prices which regulates the cost of any additional works that may be ordered, or of any works that may be omitted.—I am, Sir, &c.,

WM. ATKINS.

39, South Mall, Cork, July 20th, 1874.

## THE PROPOSED NEW CITY FRUIT AND VEGETABLE MARKET.

SIR,—Some time since the Markets' Improvement Committee advertised for designs for a fruit and vegetable market, and received in reply some 24 designs; and, as in the competition for the dead-meat market I had been successful, I thought to try my fortune again.

For the information of those who do not know the site, I would say that the present Farringdon Market stands on the side of a hill, with Shoe-lane at its highest level, and Farringdon-street at its lowest, the difference in gradient between the two being 18ft. 6in.

The particulars furnished to competitors were very meagre. They told little; and, I may say, gave no information beyond the fact that a market for fruit and vegetables was required, and that the present site was the spot on which it was to be built; from which it might be inferred that the Committee had no definite idea of the form the market should take, and so invited the architectural world to ransack its brains, or, in other words, men were invited to give the result of their experience, and embody the whole in architectural drawing. Now, I was one of those who supposed that he who most economised the site, showed the fullest extent of its utilisation, and made withal an attractive design, would carry off the blue ribbon; but in that I was mistaken, as the following extracts from the public papers will show.

The design placed first contemplates cutting down the side of the hill, roofing over the excavated space, and having one market only, although it would be buried and necessarily badly ventilated, surrounded as the site is on three of its sides by high buildings. The Shoe-lane side, however, is open, and the conclusion that most people would arrive at is, that as light, air, and ventilation could be that way obtained, it should so be; but, singular to relate, this is to be built on—the sanitary effect of which is obvious.

Every market of importance in this country and on the Continent is placed in a public way, that traffic may flow through it, and trade follow in its train; but this is to be a departure from the ordinary rule, and is to be "run to earth."

At a meeting of Common Council (vide *City Press*), Mr. Deputy Fry, a member of the Committee, asked Mr. Rudkin, the chairman, "Whether the Court was to be committed to the principle involved in the £300 premium design."

"Mr. Deputy Fry maintained that it would be inconsistent to give £300 for a design which involved one distinctive principle, as being the best approved, and to build a market on the very opposite. If they carried out the plan of 'Estelle,' they would build in a hole, and it would not be appreciated. With two such frontages as they had in Farringdon-street and in Shoe-lane, they ought to be able to make a market that would draw."

Again, on Monday, June 30 (vide the *Times*), "Mr. Deputy Fry contended that if the market was built on the low level, it would be simply burying it, and thus repeating the existing failure."

"Mr. Rudkin, the chairman, replying to an observation by Mr. Deputy Fry, said the upper market would be reached from the Shoe-lane side of Farringdon-street, Stonecutter-street, i.e., the present connecting way between Farringdon-street and Shoe-lane, being abolished and built over." But the design placed first has no upper market. Mine, however, which has been placed third, has an upper and lower market, an arrangement which the configuration of the site naturally suggests, and of which examples are not wanting (see Aberdeen, Brussels, &c., &c.).

My object in writing is contention for position; for although I am beaten, I feel not to have been fairly defeated; and as I charge "Estelle" with not having solved the problem satisfactorily, which sentiment is largely shared by many members of the Court, as evidenced by Mr. Lawley's motion on the Agenda paper



for Thursday, 16th July, and which runs as follows:—  
 "It be referred to the Markets' Committee to consult the architect, or take other professional advice, as to the desirability of erecting a high and low level market [which is the distinctive feature of my design] on the site of the present Farringdon Market, reporting forthwith to the Court." I ask him to publish his design, and I will publish mine, in the professional papers. We shall then have the advantage of professional judgment, and each design will be relegated to its right status.—I am, Sir, &c.,  
 106, Cannon-street. T. E. KNIGHTLEY.

#### THE ROYAL ACADEMY AND THE HANGING COMMITTEE.

SIR,—A pamphlet marked No. 1, price one shilling, under the above title, has been written by certain painters who sign themselves as their "obedient servants," the Authors, "to Messrs. Calderon, Faed, Hook, Lewis, Leighton, Millais, and Watts," all of them R.A.'s. Those who have advocated the mental culture of artists must be delighted to see them enter the lists of publicity armed with pen, ink, and paper. Whatever the relations between the Academy and the profession at large may be, the unpopularity of the Academicians is to be ascribed less to their "hanging," than to their "having so little worthy of hanging." The Press, that has spoken with "no uncertain voice," has criticised the dealings of the Academicians in general, and our joint-authors find fault with them in particular. Out of 36 pages, not less than 15 are extracts from newspapers, and the other 21 consist partly of abuse directed against painters, especially Academicians, and those who found favour in their eyes; two pages and a half of codified "desiderata," and a brief summing up, commencing with the words "We have done," conclude the pamphlet.

It is a pity that the joint-authors have rushed into print. If they are painters whose pictures have been rejected, and if their paintbrushes are not handled with greater skill than their pens, it is a still greater pity. Their writing is pervaded by a low tone, prompted by a mercenary spirit. Their grievance is not an artistic, but merely a trade grievance. Not one argument is brought forward with a view of elevating the sunken state of our art; of curing the paralysis of imagination; of invigorating the decaying "stimulus of free competition." The whole of this painful wall refers to "skying," to which are added some few envious complaints "that the worst Academicians are, sure of, a good place." One would have expected from certain disappointed artists a well-written, intelligent, and even dashing attack on old celebrities, who sit like Minos, Eteokos, and Rhadamanthus, judging the fresh and blooming offsprings of their brethren in art, contemplate them with eyes full of envy, and condemn them to the terrible doom of "not hanging at all," or to "skying," which is as much as not to be *in situ*, according to the joint-authors.

The simplest remedy for all disappointed artists, painters of lofty thoughts, historical scenes, "still lives," &c., would be to hire a room and to show at the charge of 1s. their "rejected and unhung pictures." Such would be the best solution of the difficulty. Should the public find that the Hanging Committee had perpetrated any gross injustice, the reputation of the Academicians would sustain more damage than any amount of abuse from discomfited painters could inflict. If outsiders do not like to be "skied," let them hang their pictures all on a line in a room, say, in the Albert Hall; the public could then see the massacred innocents, take compassion on them, and the cruel Academical Herods would lose their prestige for ever. Co-operative stores for the sale of grocery, provisions, haberdashery, and other equally important necessities are in fashion—why should not a co-operative store deal in textile fabrics painted in oil? In so practical a country as our own, so thoroughly versed in the philosophical principles of Political Economy, and the laws of Supply and Demand, artists should have no difficulty in combining and showing whether they can meet any public æsthetic demand.

What I intend to deal with is the lamentable ignorance of these joint-authors in everything relating to art. I am extremely glad that they do not sit as a hanging committee, for I never read anything more scurrilous than their criticism on known and unknown painters. Of Mr. Fildes's picture they prosily remark: "The completeness and satisfactoriness (sic) of the rendering are beyond praise." I should have thought that completeness rendered satisfactoriness superfluous. That the scene of misery "positively appals" the joint-authors is not exactly what one would have expected to hear from refined art-critics. Nothing positively appalling belongs to the domain of genuine art. Of the excellent grouping, the masterly colouring, the powerful dramatic effect of Mr. Fildes's picture no mention is made. I read that Mr. Millais "is not afraid to paint Nature as she is, and despises all paltry conventionalities." Nothing could be worse than art based on such principles. Nature, as she is, is only the alphabet with which the artist expresses himself, but he must observe conventionalities. The flat canvas on which he has to produce rounds, perspective, depths, in itself requires certain artistic conventionalities, without which his art would be no art. Mr. Harry Moore's "A Wreck Ashore" makes the joint-authors "hear the waves sounding in their ears"—as if they could hear them sounding elsewhere. Mr. Moore (probably because he is no Academician) is to the joint-authors "an artist in advance of his age, totally unappreciated by the public, and almost universally

ill-treated [?] by the Academy" [they accepted two of his pictures]. He speaks a language they [who are the 'they' ?] do not understand, as it is not yet the fashion to paint Nature as she is." This is said on page 6, and on page 5 the joint-authors say that Mr. Millais "is not afraid to paint Nature as she is." Of Mr. Hart they say, with little artistic courtesy, that he has passed into a proverb for the last twenty years, and stood alone as the annual jeer and scoff of artists. "Now he is joined by Messrs. O'Neil, Cope, and Thornburn." A man who lived for twenty years on the annual jeers and scoffs of such art-critics might live a little longer, and even succeed in getting his pictures "lined." Mr. Frith, one of our best and most powerful modern painters, comes in for the greatest amount of abuse. He is said "to have relied on the dresses and millinery to make his pictures go down. Even here he is tame and spiritless." His pictures are sweepingly condemned as "deliberately-planned pieces of namby-pambyism." Art-criticism of this kind savours too strongly of tobacco and grog. There must surely be a mode of criticising without such tasteless verbiage. Mr. Frith has done well this year, and one can only regret that the same praise is not due to all the other artists. Of Mr. Cooper it is said that he has been trying in his "giant bull to prove himself as good a man (this reminds one forcibly of the Christy Minstrels) as Davis, and has not succeeded"; his pictures are said to be "as smooth as tea-boards and about as beautiful." Any one may call pictures tea-boards. Of Mr. Leighton, with a view of hitting Mr. Armitage as hard as possible, the joint-authors exclaim, in raptures: "He is always refined [?], scholarly [?], and keenly alive to the grace [?] and subtleties [?] of form." These critics, who affect to despise all paltry conventionalities, suddenly burst into a pean on the greatest conventionalist amongst all the painters of Old and New England! This painter of flats, this poor imitator of Giotto without possessing his genius, this faded colorist, this semi-pre-Raphaelite, who thinks that to be meaningless but smooth is all an artist has to strive for, is admired. What can the æsthetic principles of these joint-authors be? For on the one side "nature" is everything to them, and on the other, the tamest conventionalist, who sees neither shade nor light, is "an artist whose pictures will add to his high reputation." That, with such principles, Mr. Redgrave should be scoffed at, is only an honour to the veteran artist, who has not only earned a reputation as a landscape painter, but has devoted his whole life to the practical and theoretical advancement of Art. I pass the other incongruities and contradictions, and quote only a few words on a picture by Mr. John Lewis, who is familiarly called by the joint-authors, *John Lewis*. It is stated that this artist is "still a reverent student of nature, and his simple faith is the secret of his success, for his pictures are not distinguished by any striking intellectual qualities."

Painters and joint-art-critics who can write like this are beyond the jurisdiction of any intellectual court of Æsthetics. So long as such ideas prevail amongst our artists, intellect being ostracised and vulgar copying extolled, they cannot hope to see their art mightily progress. Fortunately, however, artists with the word "nature" everlastingly on their lips, and no ideas in their brains, are becoming curiosities even amongst us. The principal questions with regard to our Academy are not the number of Academicians; the kind of jury that ought to decide on the merits of works of art; or whether the officials should be members of the Royal Academy; or that an account and balance-sheet should be printed annually (this point is printed by the joint-authors throughout in italics); the vital question is how to raise the general standard of the mental and artistic culture of our artists and our public; how to destroy in them a low spirit of trading, and diminish their ignorance in matters of art and their coarseness of taste.

For this purpose, I would suggest the establishment of the following professorships at the Universities, ladies' colleges, and especially at the Academy:—

1. A Professor of English Literature. It is a disgrace to us that if we want to see our immortal Shakespeare, or Milton, or even Tennyson, worthily illustrated, we must turn to foreigners; that we cannot point to a single really grand historical painting, though our history abounds in the most dramatic scenes.
2. A Professor of Universal History.
3. A Professor of Art History.
4. A Professor of Archaeology.
5. A Professor of Comparative Mythology, Symbolism, and Iconography.
6. A Professor of Æsthetics.
7. A Professor of Psychology, with special reference to artistic compositions.

If our artists and the public were thus trained mentally, they would not seek to remedy any shortcomings in art by balance-sheets and accounts, by reforming the titles of Academicians, by skying or lining, selling and trading; but they would know that the greatest sculptors, painters, and architects, of ancient and modern times, were not out-growths of academies.

Let sound art-principles and a correct appreciation of beauty be taught with the same earnestness of purpose as are taught so many useless branches of education, and our art will not be compelled to beg favours from a Hanging Committee. The outsider, if a real artist, wants no academy; he works, and does not expect that Academic "manhood" should offer him "no favour but a fair field." If any additional proof of the fact that our artists need a totally

different training from that which they receive were required, this pamphlet abundantly furnishes it.—I am, Sir, &c.

A FELLOW OF THE ROYAL HISTORICAL SOCIETY.

SIR,—A City auctioneer protested in your last issue against Mr. E. W. Godwin supposing that gentlemen of his profession are not qualified to perform the duties of an architect.

For himself it appears that he went through the course of lectures at University College, and spent several years of his life in the office of his father, an architect. If this is supposed to be sufficient training for the profession, I submit that it is a solitary instance of an auctioneer being so qualified, for a large number have taken to the hammer, after spending years in other occupations.

It is quite time some one called the attention of the architectural profession to the fact that much of the legitimate work of an architect is undertaken by auctioneers. I have heard of them in "light and air" cases (when they exhibited the minimum of skill and charged maximum fees), dilapidations, and acting as designers of buildings.

A number of houses now being erected not far from the "Elephant and Castle," alterations to a tavern at Sydenham, new buildings recently erected on Ludgate-hill, new premises shortly to be erected in the Strand, and rebuilding after fire near S. Martin's-lane, are all under the direction of gentlemen well known as auctioneers, who may employ architects, but if they do, their names do not appear.

I cannot understand persons employing members of one profession to do the work of another; but, more strange still, solicitors so frequently recommend auctioneers for the work of architects, it cannot be that they do not know the difference. The custom of allowing agency fees for introduction; so common with gentlemen of the hammer, must give them an advantage in legal eyes over the knights of the T square.—I am, Sir, &c. SURVEYOR.

## Intercommunication.

### QUESTIONS.

[3400].—Preserving Iron.—May I ask any of your practical readers which is the best paint to preserve iron from oxidation, and from the effects of smoke?—P.

[3401].—Grates.—Can any one of your numerous readers oblige me with information respecting the actual advantages of any of the numerous ventilating grates before the public? Only those who have had experience in testing their capabilities can furnish this.—J. H. B.

### REPLIES.

[3386].—Liabilities of Architects.—I think "B." in his reply in the BUILDING NEWS of 17th July, has hit the nail on the head. The breach of contract is certainly with the builder, and he is liable at any time for a wilful deviation from the plans and specification. I think if "Nemo" will look over the "Legal Intelligence" in the BUILDING NEWS some time three or four years since, he will find a case in point. In this case, an architect (name, I think, Fogerty) was sued for damages in a case similar to that of "Nemo," and the Judge ruled that the builder was liable for the breach of contract, and not the architect.—S. J. H.

[3386].—Liability of Architects.—"Nemo!"—I repeat that "Nemo" is guilty of want of both diligence and careful consideration in his duty to the parson and his committee, and that, without any regard to any one builder, and this he must know, or ought! For "B." in your last issue to say so much, and of such little importance, appears weak and very indifferently correct. "Nemo" was employed to lay down the work and material required; he did so, and when all was done, "Nemo" was called upon to see that all was correct, and upon his certificate alone the money was paid. Now he finds that what he said was correct; he sees, as he should before writing have seen, that all was not done correctly, consequently he must pay the penalty. And this goes to prove that the architect has to deal with both quantity and quality. I notice this paragraph in "B." "The architect's certificate is for the purpose of enabling a builder to get his money; it is not a guarantee that every item has been done." The doctrine here set forth is very erroneous, for the certificate is, as a rule, a condition of payment, and for it the architect is liable to the general employer as to the honesty of his certificate, and for all the effects arising from his certificate the architect's liabilities follow. I should certainly advise "Nemo" and "B." to carefully study "Jenkins and Raymond."—M. G.

[3386].—Liabilities of Architects.—The reply of "B." to "Nemo's" question, in which he alludes to my reply, has caused me to examine somewhat further into the matter, with the result of finding that I am correct. A handbook lately published, the work of E. Jenkins and J. Raymond Esqs., Barristers-at-Law, contains the following:—"If an architect were to undertake to superintend the erection of works, it is apprehended that a reasonable amount of attention would be implied, and that if any loss were occasioned by any neglect on the part of the architect, he would



be liable; and there being no decisions which define the limit of the architect's authority in the general superintendence of the works in the absence of any express agreement, we apprehend that evidence of usage would be admissible, and that the usage would be imported into the contract (*i.e.*, contract between employer and architect)." W. Cunningham Glen, Barrister-at-Law, quotes: "In every trade or profession it is important that the usages of it should be understood by the respective parties to a transaction; for if there be a general usage applicable to a particular trade or profession, persons employing one in such trade or profession will be taken to have dealt with him according to that usage, *Sewell v. Corp.*, 1 C. and P. 392 (unless by express stipulation to the contrary)." What I contended in my reply was that if the architect had been negligent, or had not brought ordinary and usual care and skill to the performance of his work, then he is liable to be sued for the loss and damage occasioned to his employers by reason of such negligence and unskillfulness. Whether in the case in point such negligence had occurred, is a question about which employers and architects may fairly differ. It is entirely a matter of fact, which in an action at law would be left for the jury to decide, and one about which I apprehend different juries would differ. I had not, as "B," infers, forgotten the builder. The Committee's contracts were separate and distinct; first, with the builder to do the work according to the specifications; secondly, with the architect to superintend such work, and use ordinary diligence and precaution in seeing that the builder does so do his work. If either of the persons with whom the committee contract fail to do properly what they have contracted, and have been paid to do, the committee have a right, on proof of such failure, to recover their loss.—L.

[3389.]—**Architects' Charges.**—For "Architect's" information as to the proper charge to be made for laying out an estate for building purposes, I may quote the following paragraphs from the Schedule of Professional Practice and Charges published by the Royal Institute of British Architects, and confirmed at the General Conference of Architects held two years ago:—"(17) The charge for taking a plan of an estate, laying it out, and arranging for building upon it, should be regulated by the time, skill, and trouble involved. (18) For actually letting the several plots (in ordinary cases), a sum not exceeding a whole year's ground-rent may be charged. (19) For inspecting the buildings during their progress (so far as may be necessary to insure the conditions being fulfilled), and finally, certifying for lease, the charge should be a percentage not exceeding one-half per cent. up to £5,000, and above that by special arrangement. (20) All the above fees to be exclusive of travelling expenses, and time occupied in travelling. . . (21) The charge for the above does not include the commission for preparing specification, directing, superintending, and certifying the proper formation of roads, fences, and other works executed at the cost of the employer, nor for putting the plans on the leases."—DELTA.

[3389.]—**Architect's Charges.**—In reply to "Architect," if he has been employed by a client or Building Committee, he should charge a percentage on the outlay of laying out the roads—say 2 per cent. If the work has been done for a solicitor, as a means of getting the land let, or as an inducement to build by showing in what manner the land can be best appropriated, a charge for time only may be fair. Architects and surveyors have to adopt their own mode of charging for such plans as a rule, but the above principle is adhered to by a great many practitioners. "Architect" might charge on the available return his scheme would make.—G. H. G.

[3390.]—**Girders.**—The simplest plan of connection of the cross girders to the box girder would be by a plate bolted through plate of box girder, its end being turned out to receive the bearing. A better plan would be a cast-iron socket, or bracket, bolted to the main girder, care being taken that the pressure on the bearing should not tend to buckle or weaken the plate of box girder.—J. H. B.

[3394.]—**Construction of Sewers.**—I am of opinion that the invert or entire ring of sewer should be set in mortar or cement, as no advantage can possibly arise by having some courses "laid dry." Besides, if the subsoil requires drainage, it should be either by a separate system, or sufficient drain-pipes could be laid for that purpose.—G. H. G.

[3397.]—**Window Sashes.**—"Engineer" will do well to turn to the BUILDING NEWS for December 20, 1872, where (p. 480) he will find full description and engraving of Cutter's patent sash-fastener and plates. Also to p. 227, February 21, 1873, where will be found a description of Meakin's patent sash and fastener. An illustrated series of articles on sashes and sash-fasteners, from the pen of Mr. Banister Fletcher, also appeared in the BUILDING NEWS during the first half of 1873, and will be found at pp. 40, 118, and 228 of Vol. XXIV.—DELTA.

Arrangements have been made for a visit of the Members and Associates of the Society of Engineers on Wednesday, the 29th instant, to the new station of the Imperial Gas Light Company at Bromley.

The City of Bristol is about to carry out a scheme of street improvement, which will involve an expenditure of £100,000.

## Our Office Table.

**TEMPLE BAR.**—Temple Bar, if not soon pulled down, will fall down. The excavations for the foundations of the New Law Courts did not improve the stability of the old gate, but the recent landslip in Bell-yard has absolutely endangered it. The City authorities have had the structure shored up on the Law Courts side, and have had a strong timber centering fixed in the arch over the footway through the gate on that side.

**GOOD NEWS FOR MR. RUSKIN.**—A Cincinnati newspaper, in a fraternal outburst of admiration of the new premises recently erected in New York by the *Tribune*, winds up by declaring that: "In short, the building meets all the conditions imposed on architects by John Ruskin; and I feel sure that when Ruskin fulfils his threat of burning down this city, to gloat his wrath against the works of our incompetent house-builders, there is at least one edifice he will spare, as a monument of architectural beauty."

**A PROPOSAL TO TUNNEL MONT BLANC.**—During the past year M. Ernest Stamm, an Alsatian engineer, devoted much time and care to the study of a question of a connection between France and Italy independently of Swiss territory. With this object the idea of tunneling Mount Blanc is advocated by him in a paper which has been read by M. Stamm before the Société Industrielle de Mulhouse. A survey proves that while Chamounix is 3,445ft. above the sea-level, and Entreves, on the south, 4,216ft., a tunnel between the two points would not be longer, nor its gradients more difficult, than the Mont Cenis Tunnel.

**THE PALESTINE EXPLORATION FUND.**—The July Quarterly Statement of the Palestine Exploration Fund contains an obituary notice of the late Mr. C. F. Tyrwhitt Drake, by Lieutenant Conder. Mr. Drake was only 28 years of age, and his death will for some time be a hindrance to the work of exploration. Lieut. Conder also contributes a paper on the identification of Enon, "the place near Salim where there was much water" (S. John iii, 23). He offers too a solution of the problem of the tells of Palestine. They are, he thinks, brickmaking accumulations. He traces the victory and pursuit of Gideon (Judges vii.), and argues in favour of Ras el Ain as the site of Herod's Antipatris. Mr. Tyrwhitt Drake's last report refers to the continued subsidence of the bottom of the Dead Sea, and gives some particulars of the curious Kurn Sartabeh of Akrah, and the ruins of Herod's town of Phasaelas. M. Clermont-Ganneau's reports continue in importance and interest. To architects and archaeologists interested in the controversies which have grown up round the Kubbet Sakhra, the most valuable portion of his communications will be the account of the columns and balustrade of the building. The excavations in Jerusalem, for want of funds, have recently been limited; they consist principally of those in and about the rock-cut chambers north of the Via Dolorosa.

**ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS.**—The members of the Home Counties District of the above Association will hold a meeting on Wednesday, the 12th of August, at Tottenham. The Tottenham Local Board of Health have consented to allow the members to visit their sewage works in the Lea Valley. The directors of the Alexandra Palace Company have given permission for the inspection of the Alexandra Palace building by the Association. The members will assemble at the Tottenham Local Board Offices, High Cross, at 11.30 a.m. They will then proceed to the sewage works; after which they will drive to the Alexandra Palace, arriving there about 1.30 p.m. After the inspection of the building, the business of the district will be taken, with a discussion on the day's work, and short papers read. Members desirous of reading short papers, or having any motions to bring forward, must declare their intention, and state subject, to the hon. sec. on or before the 8th of August.

## CHIPS.

A new Free Church is about to be erected at Galashiels, at a cost of £4,500, to seat 800 people. Mr. Starforth is the architect.

A cottage hospital is about to be erected at High Wycombe. Mr. Arthur Vernon is the architect.

The death is announced of Mr. John Grantham, M. Inst. C.E. For the last four years he was very much occupied in bringing to perfection his "steam car for tramways." Mr. Grantham was a member of the Council of the Institute of Naval Architects, to which he contributed several papers.

On Monday afternoon the sods of a new park for Sheffield, given to the town by Mr. Mark Firth, were turned by several members of his family. The park will be about thirty acres in extent. It forms a portion of what is known as the Page Hall Estate, which was recently purchased by Mr. Firth for £26,000.

A new drinking-fountain, of grey polished granite, is now being inserted on the north side of S. Clement Dane's Churchyard railings, Strand, opposite to the new Law Courts.

Sir Robert Phillimore, in the Court of Arches, on Friday, admitted "the libel of appeal" from the judgment of the Bishop of Exeter ordering the removal of the reredos which has lately been a subject of controversy.

The foundation-stone of a new church at Faceby, Yorks., was laid on Thursday week. Mr. Falkenbridge, of Whitby, is the architect, and Mr. Barton the contractor.

The memorial-stone of a new Primitive Methodist Chapel at North Moreton was laid on Monday week.

The Jamaica Level Schools, Bermondsey, were erroneously described in last week's BUILDING NEWS as having been designed by Messrs. H. Jarvis and Son. The building was designed and carried out by Mr. E. B. Robson, the architect to the London School Board.

The annual meeting of the Builders' Benevolent Institution will be held on Thursday next, at Willis's Rooms at 3 p.m.

The School Board for London will enter into possession of its new offices on the Thames Embankment on the 10th September.

The fine old church at Withiol, Cornwall, six miles west of Bodmin, is undergoing great alterations. The roofs have been covered with Duchess Delabole slates.

It has been decided to rebuild the church of S. Feock, Cornwall.

The next international congress of archaeologists is to meet at Stockholm on the 9th of August, and will continue sitting till the 16th.

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CHUBB and SON,  
Makers to the Bank of England,  
57, S. Paul's Church-yard, E.C. } London.  
And 68, S. James' street, S.W.—[ADVT.]

## Trade News.

### WAGES MOVEMENT.

**BRADFORD.**—The slaters of Bradford have demanded an increase of wages. This having been refused, they now give notice that they will start a business of their own on co-operative principles.

**LLANBERIS.**—After five weeks' cessation, active operations at Mr. Assheton-Smith's extensive slate quarries at Llanberis recommenced on Monday. About 2,000 men have resumed work. One remarkable feature in connection with the re-opening of the quarries is the absence of most of the young men previously employed there before. Most of the men have left the neighbourhood in quest of work at other quarries, and Mr. Assheton-Smith will experience considerable difficulty in replacing them.

**LONDON.**—On Saturday evening a large meeting of the London building labourers was held in Trafalgar-square, in reference to the proposed strike for the advance of wages to 6d. per hour. About 2,000 men were present. It was understood that the contemplated strike, at least for the present, was abandoned.

**PENRYN.**—Lord Penryn has threatened to lock out his workmen unless they sever their connection with the North Wales Quarrymen's Union. The men appear to be treating the notice with something like contempt, and those not already members are joining the Union at the rate of from 50 to 100 nightly. After Mr. Assheton-Smith's defeat, Lord Penryn is scarcely likely to carry his point.

## The Timber Trade.

The following are the wholesale prices for Timber, Deals, Mahogany, &c. :—

		Per superficial foot.			
		s.	d.	s.	d.
Mahogany					
Honduras (cargo average)		0	4½	0	5½
Mexican		0	4½	0	5½
Tabasco		0	6	0	6½
Cuba		0	7	0	10
S. Domingo		0	7	0	10
"	curis	1	0	2	0



	s.	d.	s.	d.
Cedar				
Cuba	0	4½	0	5½
Honduras	0	4	0	5
Australian	0	3½	0	4½
Pencil	0	2½	0	3½
Walnut				
Italian	0	4½	0	5
Black Sea	0	3½	0	4½
Canadian	0	3	0	4
Satinwood				
S. Domingo	1	0	1	6
Per Ton.				
Satinwood	£	s.	£	s.
Bahama	7	0	9	0
Rosewood				
Rio	14	0	20	0
Bahia	12	0	18	0
Lignum Vitæ				
S. Domingo	6	0	10	0
Cuba cocowood	5	0	7	0
Turkey boxwood	5	0	16	0
Barwood	4	5	4	10
Brazil, 2nd and 3rd	20	0	25	0
" unbranded	14	0	20	0
Brazilletto	3	0	3	10
Camwood	10	0	30	0
Jamaica Fustic	6	15	7	10
Logwood				
Campeachy	9	0	9	5
Honduras	7	0	7	5
S. Domingo	4	15	5	0
Jamaica	5	5	6	0
Cargo Wood	12	10	14	0
Red Sanders	6	10	6	15
Bimas Sapan	9	0	12	0
Slam	10	0	12	0
Per 50 cubic feet.				
Riga fir	80	0	85	0
Swedish	50	0	65	0
Red pine	70	0	130	0
Yellow Pine (large)	100	0	130	0
" (small)	80	0	90	0
Quebec oak	160	0	180	0
Baltic	100	0	160	0
Teak	240	0	280	0
Per Mille.				
Baltic staves	220	0	300	0
Quebec (per standard do.)	80	0	85	0
Per 120 12ft. 1½ by 11.				
Geffe, 1st and 2nd yel.	3	by 9	16	10
" "	2	by 9	16	0
" "	4	by 11	16	0
" "	2½	by 7	15	0
" 3rd yellow	4	by 9	15	0
" "	2½	by 7	14	0
" "	3	by 9	15	10
" "	4	by 8	15	0
" "	3	by 7	14	10
" 4th yellow	4	by 12	14	0
" "	2	by 7	14	0
" "	2	by 9	14	10
" "	3	by 9	14	10
" "	3	by 11	14	0
" "	2½	by 7	13	10
" 1st & 2nd white	3	by 9	12	15
" "	2½	by 7	12	0
" 4th white	3	by 9	10	10
Petersburgh, 1st white	3	by 11	14	0
" "	3	by 9	13	5
" 2nd white	3	by 11	12	0
" "	3	by 9	11	10
" 1st yellow	3	by 9	16	0
" "	3	by 7	15	0
" "	2½	by 7	15	0
" 2nd yel.	3	by 9	14	5
Stockaviken, 1 & 2 yel.	3	by 9	15	10
" 3rd yellow	3	by 9	15	0
" "	3	by 8	14	10
" 4th yellow	3	by 9	14	10
" "	3	by 8	13	10
Swartwick, 1st & 2d yel.	4	by 9	15	0
" 3rd yellow	4	by 9	15	0
" "	2½	by 9	15	0
" 4th yellow	3	by 9	13	10
Holmsund, 1st & 2d yel.	3	by 9	16	0
" 3rd yellow	3	by 9	15	10
" "	3	by 7	14	10
Ljusne, 1st yellow	3	by 9	16	0
" 1st & 2nd yel.	3	by 8	14	5
Sandarne, 1st & 2nd yel.	3	by 9	16	10
" 3rd yellow	4	by 9	15	0
Per 120 12ft. 2½ by 6.				
Dram, 1st yellow	2½	by 5½	11	10
" 2nd "	2½	by 5½	11	5
" "	3	by 6½	11	10
" "	2	by 4	10	10
" 3rd "	2½	by 6½	11	0
" "	2	by 4	9	0
" 1st and 2nd white	2½	by 6½	11	0
" 2nd white	2	by 4	9	0
" 3rd "	3	by 6½	10	0
Quebec, 1st bright fine			24	0
" 2nd "			15	5
" 3rd "			13	10
" 4th "			11	10
" 1st dry floated (wide)			24	0
Per 120 12ft. 3 by 9.				
S. John's unsorted spruce			17	10
Quebec 1st spruce			20	10
Miramichi unsorted spruce			17	15

Riga lathwood	Per 216 cubic feet.	£	s.
Petersburgh lathwood		10	0
		11	0

### WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay.—For samples and further particulars, apply to the MANAGER, at the Quarries Narberth-road, R.S.O.—[ADVT.]

### TENDERS.

**BEARLEY.**—For a new vicarage house. Mr. Edwin Dolby, architect, Abingdon.  
Clarke and Smallwood £1,025 0 0  
Hirons 1,000 10 0  
Mills 929 15 6  
Sheasby (accepted) 910 0 0

**BRISTOL.**—For certain additions and alterations to the museum and library, Queen's-road, Bristol. Mr. S. Colman, architect. Quantities by Mr. A. Deane.

Brock and Bruce	£6,193 0 0
Kington	6,166 0 0
Church and Phillips	6,150 0 0
Eastbrook and Sons	5,998 0 0
Davis and Son	5,985 0 0
Veale	5,800 0 0
Wilkins and Son	5,750 0 0
Baker and Son	5,700 0 0
Howell	5,637 0 0
Krauss	5,550 0 0
Diment	5,399 0 0
Bryant	5,160 0 0
Cowlin and Sons (accepted)	4,850 0 0
Summerville	4,657 0 0

**BRISTOL.**—For schools to accommodate 750 children for the Bristol School Board. Mr. Stuart Colman, architect, 29, Clare-street. Quantities by Mr. A. Deane.

Schools.	Boundaries.	Total.
Davis and Son	£3,385	£335
Diment	3,319	328
Bryant	3,311	305
Eastbrook and Son	3,175	322
Walters and Crick	3,040	317
Summerville	2,938	303
Krauss	2,918	302
Cowlin and Son	2,907	305
Beaven and Son	2,839	307
		3,146

**BRINKLEY.**—For new clerestory walls, new roofs, and general repairs to the Church of S. Mary, Brinkley, near Newmarket. Mr. Frederick Thomson, architect.  
Mason and Son (accepted) £495 0 0

**CHELSEA.**—For repairs of church and decoration of chancel, St Luke's Church. Messrs. Goldie and Child architects Pitman & Cuthbertson (accepted) £405 0 0

**DULWICH.**—For residence for Mr. Rich. Messrs. John Young and Son, architects.

	1st.	2nd.	Total.
Burrows	1,864	183	2,047
Lawrance	1,777	162	1,939
Hart	1,780	162	1,932
Newman and Mann	1,716	185	1,902
Robbins	1,620	190	1,810

**KENTISBURY.**—For the restoration of Kentisbury Church. Mr. Edwin Dolby, architect, Abingdon, Berks.

Section No. 1. Restoration of Nave, including New Arcade.  
Ball £594 0 0  
Harding 535 3 11

Section No. 2. New North Aisle.  
Ball 416 13 0  
Harding 391 11 7

Section No. 3. Restoration of Chancel, including New Chancel, Arch, and Gable.  
Harding (accepted) 498 0 0

**LONDON.**—For vaults and foundations, No. 48, Mark-lane, for Mr. T. Dawson Kiddell. Messrs. John Young and Son, architects.

	1st.	2nd.	Total.
Ashby and Horner	£2,670	£389	£3,059
Lawrence and Sons	2,582	460	3,042
Young	2,490	500	2,990
Brass	2,587	398	2,985
Conder	2,529	376	2,905
Lawrence	2,483	357	2,840

**LONDON.**—For alterations, &c., to No. 28, Great Tower-street, London, for Mr. Thomas Stevenson. Messrs. Wm. Gosling and Son, architects, Woolwich. Quantities supplied.

Perry	£720 0 0
Vickery	431 0 0
Stephenson	419 0 0
Sawyer	391 0 0
Warr	364 0 0
Greavet	340 0 0
Stead	336 0 0
Staines and Son	328 0 0
Johnston	307 0 0
Raby (accepted)	298 10 0
Stamp and Co.	297 0 0
Cumming and Co.	280 0 0
Horne	255 0 0
Pearce	253 0 0
Hunt	210 0 0

**LONDON.**—For sewers for the Vestry of S. Leonard's, Shoreditch. Mr. G. C. Perrett, surveyor. Messrs. Waterlow paying £40 towards the cost.

Rendall	£868 0 0
Marskall	750 0 0
Wood	739 0 0
Waldram and Co.	674 0 0
Wainwright	650 0 0
Keeble	593 0 0
Pearson	549 0 0
Harris	539 0 0
Barnes and Gardiner	460 0 0
Wall Bros.	320 0 0!!

**LONDON.**—For public hall and offices at Hackney. Mr. Henry St. John Ingram, architect. Quantities supplied by Mr. Hollands.

Merritt and Ashby	£5,993 0 0
Cooke and Green	5,455 0 0
Kilby	5,311 0 0
Waldram and Co.	5,325 0 0
Willson Bros.	5,219 0 0

**MANCHESTER.**—For shops and offices to be built in High-street, and Thomas-street, for Messrs. Peverley and Blakey. Mr. Edmund Sherwood, architect. Quantities by the architect. The foundations put in by Mr. J. Littler at a cost of £170. The iron fronts and patent shutters to be supplied at a cost of £300.

Warburton	£4,600 0 0
Foggett	4,416 0 0
Adams and Marshall	4,200 0 0
Thompson	4,183 0 0
Herd	4,097 0 0
Davison	4,091 0 0
Scarlett Bros.	4,080 0 0
Neill and Sons	4,013 0 0
Littler	3,996 0 0
Holt	3,912 0 0
Foreman and Todd (accepted)	3,892 0 0

**MIDDLESEX.**—For the erection of a vestry hall and offices for the parish of St. Sepulchre. Mr. Lewis H. Isaacs, architect. Quantities by Mr. L. C. Riddett.

Hill, Higgs, and Hill	£2,429 0 0
L. H. and R. Roberts	2,368 0 0
Bishop	2,365 0 0
Baves and Ramage	2,100 0 0
Kilby	2,092 0 0
Lister	2,172 0 0
Wall Bros.	1,993 0 0
High	1,922 0 0
Elkington	1,898 0 0

**PETERBORO'.**—For new bank. Mr. W. Eve, architect.

Fast	£4,800 0 0
Sheffield	4,277 0 0
Waldram	4,177 0 0
Foster	4,131 0 0
Nightingale	3,993 0 0

**SOUTH HACKNEY.**—For the erection of Christ Church vicarage. Messrs. Henry Jarvis and Son, architects, 29, Trinity-square, S.E.

Falkner	£2,587 0 0
Tarrant	2,500 0 0
Lawrance	3,494 0 0
Downs	3,492 0 0
Ennor	2,477 0 0
Hearle	2,475 0 0
Stevenson	2,462 0 0
Shepherd	2,413 10 0

**S. PANCRAS.**—For decoration of church, and repairs &c., of schools, Christ Church, Chilton-street. Messrs. Newman and Billings, architect.  
Pitman and Cuthbertson (accepted) £493 0 0

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### COMPETITIONS OPEN.

**CARDIFF, Sept. 29.**—For designs for the proposed Free Library, Museum, and Science and Art Schools. Mr. E. Payne, Hon. Sec., The Wharf, Cardiff.

**COCKERMOUTH, Aug. 12.**—For plans for a girls' school. Mr. J. Fearon, Cockermouth.

**HASTINGS, Sept. 24.**—For designs for a new Town Hall, with police offices, lock-ups, public offices, &c. Premiums of £100, £50, and £25 will be given for the three most approved designs. Mr. G. Meadows, Town Clerk, 8, Bank-buildings, Hastings.

**MAIDENHEAD, Aug. 15.**—For plans for a system of works for the supply of water to the town. A premium of £25 will be given for the best set of plans. Mr. E. Davey, Town Clerk.

**Geometrical and Encaustic Tile Pavements** in every variety. Over Sixty New Designs at 5s. 6d. per yard super. "The Tiles are excellent, both in design and colour."—BUILDING NEWS. "They are of great excellence in design—the material is not surpassed by any found in this kingdom."—Art Journal. "The patterns are remarkably good and effective."—Gardener's Magazine, &c. &c. Designs and sample Tiles free on application to HENRY C. WEBB, Tiles, Worcester. London House, 114, Victoria-street, Westminster. Mr. T. Pulling, Agent.—[ADVT.]

### CONTRACTS OPEN FOR BUILDING ESTIMATES.

**ADMIRALTY, Aug. 4.**—For the erection of a Coastguard station at Marazion, near Penzance. Director of Works Department, Admiralty, Spring-gardens-terrace, S.W.

**EDGEWARE HIGHWAY BOARD, July 27.**—For paving and curbing footpaths, and constructing storm water drains &c. W. A. Tootell, Clerk to the Waywardens, Court House, Edgware.

**HEATON, NEAR BRADFORD, July 28.**—For excavating for and laying about 1,200 yards of 5in. and 3in. cast iron socket pipes. Mr. J. Lumley, O.E., 14, Kirkgate, Bradford.

**HEATON, NEAR BRADFORD, July 28.**—For making about 1,200 yards of 5in. and 3in. cast iron socket pipes. Mr. J. Lumley, O.E., 14, Kirkgate, Bradford.



## THE BUILDING NEWS.

LONDON, FRIDAY, JULY 31, 1874.

## THE GROCERS' COMPANY MIDDLE-CLASS SCHOOL COMPETITION.

NO competition for years past has given more general dissatisfaction than this—in fact, the committee appear almost to have gone out of their way to displease competitors and the public. First a word or two appertaining to the public. The designs submitted have been guarded as if they were crown jewels of the Great Mogul himself. The representatives of the press have had to submit to something like indecent treatment, as systematic attempts were made to exclude them. This in itself is enough to throw a haze of suspicion around the matter. Why, let us ask, should designs submitted for a public building be so shrouded in mystery? By giving to the designs, after they were submitted, such a hole-and-corner character, the committee and the consulting architect, whoever he may be, have managed to create considerable distrust. It looks as if they were ashamed of themselves or something they have done. Are the doings of the committee so peculiar that they will not bear the light? And who, we should like to know, is responsible for this pettyfogging policy? Is it Mr. Gwilt or Mr. Ruck? Perhaps some one will inform us. What harm can criticism in the professional papers do? If anything be said in such criticism worth saying it may be legitimately appropriated. If nothing be said worth saying, it may be treated for what it is worth. Cannot the authorities in this matter see at half a glance that they have made themselves look ridiculous? They have done their best to exclude the Press, and signally failed. They have, however, succeeded in arousing distrust, and making themselves look particularly small. There were some forty-six competitors, and each competitor had a right of seeing the designs and admitting a friend. Either one of those ninety-two gentlemen admitted might make what notes he liked for his own satisfaction, and of course publish them if he thought proper. But if a representative of the Press went to see the designs, the door was unscrupulously slammed in his face. "Orders were given that the Press should not be admitted on any plea whatever." This fact was no sooner known, than one competitor after another who had seen the designs offered us the use of his notes. We have availed ourselves of two, as will be seen below. Perhaps the committee, or whoever may be responsible for this paltry manoeuvring, may say that they have a right to exclude the public, as they may do what they like with their own. To this we distinctly demur. A middle-class school to be used for generations by thousands of children is a matter of public importance; as the education, the convenience, and the health of the community are matters of public importance; and as our chief desire is to serve the community, we have considered it our duty to administer this timely rebuke, hoping it will assist in preventing a similar blunder in future.

This is one more to be added to the many signal failures in architectural competition it has been our painful duty to record. The particulars issued by the Grocers' Company to intending competitors were promising, to say the least. The requirements were moderate for the sum proposed to be expended, viz., a hall or lecture-theatre for 800 persons, twelve to sixteen classrooms, kitchen and rooms for secretary, porter, head-master, and under-masters. The cost was not to exceed £12,000, and the fittings £2,000.

Best of all, the opinion of a "professional architect" was to be taken, and two premiums of 100 and 50 guineas were promised to the authors of the plans that should be considered second and third in point of excellence. This sounds all well enough, and the first question that will naturally be asked is, "What is the name of the 'professional architect?'" This mystery cleared up, the next question is, Where is his report? That the Grocers' Company owe to the few architects who have given their time and energy to the work this amount of satisfaction will, we presume, be allowed; for there can be no doubt that the great bait in the instructions issued by them was the promise that they would be guided by professional advice in the adjudication upon the drawings. As we must in honour assume that they have been so guided, the Grocers themselves must be relieved from all responsibility other than that of the selection of their professional adviser. We look down the list of our best architects in profound wonderment as to who this light to lighten the Grocers could possibly be. Scott, Barry, Street, Pearson, Shaw, Waterhouse, Christian, Godwin, Brooks, or Burges, we know: their works have been before us in abundance, and the measure of their power is tolerably well estimated by us and our readers. The judgment of any one of them would be sure to meet with some considerable endorsement, but who this new light is we are left to conjecture, and hitherto nothing that we have seen of the competition designs, and of that which we heard was the successful one, has tended in any other way than to cover even conjecture with fog and thick darkness. We can derive no possible benefit from competitions if they are to be conducted in any manner which shall in any degree savour of a hole-and-corner business. And unless in this case each competitor has been furnished with two reports of the "professional architect," an unfair mystery must attach itself to the history of this Grocers' School. We go further, and say that unless this "professional architect" of the Grocers can be identified by the architectural world as a man of practical experience and sound artistic judgment, the promise to call in such advice was, we are free to confess, something very like a delusion and a snare. Our readers will not wonder then if, after these few introductory words, we state that the competition is a disgrace to every one concerned. It is a disgrace to the Grocers, a disgrace to their architect, a disgrace to the competitors, and, above all, a disgrace to architecture. A disgrace to architecture; for of the many scores of drawings here collected, there are not, we venture to say, more than fifteen sets worth the paper they are drawn on. Some of these worthless scribbles really look as if their authors were taking a rise out of the Grocers by playing a practical joke on them anent their middle-class school. Some look like incipient struggles of the first year of pupilage, and a few might pass muster as the work of the more advanced pupils of very bad masters. It is certainly not worth while to enumerate any of these, or to give any one of them even the notice of a special condemnation. Of the fifteen exceptions, there are but a small proportion even of these which evince anything like real architectural power, or that show either the scientific or the artistic hand of the practised architect. "A. B. C.," "In Medio Tutissimus," "Nil Desperandum," and "Simple" may be noted for their fair general treatment, and for the presence of something like architecture and architectural composition. In these few we have drawings worth looking at, and deserving much longer study than we could possibly give on one visit. In "Classroom" we see plainly enough the scientific hand—a hand versed in the practical questions involved. This is seen in the careful, detailed manner in which all the sanitary points are solved, and the almost model-like fidelity observable in the illustrations of the ventila-

tion; nor does the credit attached to "Classroom" stop here, for the architectural character, slight as it is, is nevertheless well considered with a view to economy—perhaps rather too well considered. But if the art is not quite up to the mark, it is nevertheless far superior in its very simplicity and proportion to hosts of more pretentious designs. "In Medio Tutissimus" suffers from a heavy load of colour, and the design is nearly lost in a cloud of hot brick red; but those who take the trouble to look can see underneath this sensible fenestration and many piquant bits of composition. "Nil Desperandum" is the most compact design exhibited; all the accommodation is provided on two floors, and the building is well massed together. The style is Renaissance, rather French than otherwise; and the sections show what is by no means common, a continuity of the art of the exterior throughout the whole building.

"A. B. C." is perhaps the best set of drawings, as drawings, in the room. The architecture is good, though simple, and full of character, though inexpensive. The upper portion of the tower is the main defect. "Simple" shows a beautiful perspective of a very picturesque irregular mass.

"T," which we understand is the successful design, shows the hall at the back on the theatre plan. The dining-room is in the basement, and there are two stories of classrooms above the ground level. The roof of the theatre is constructionally impossible, and although there are two fireplaces there does not happen to be any chimney. Perhaps these trifles, coupled with the fact of its being one of the ugliest designs we have ever had the misfortune to see, have operated powerfully upon the Grocers, and taken their "Professional Architect" by storm for its very novelty. Altogether, in drawing, construction, and in design, this set of plans seems to us to be the crude work of a very young beginner.

We have not space to enter into the merits of other designs which we should have been pleased to notice, but cannot refrain from passing a word of commendation to the authors of the following group:—"Use and Uniformity," "Knowledge is Power," "+ + +," "Cibes," "E. Pluribus Unum," "Invicta" (good low domestic tower), "Study," and "Conservative" (this last, although apparently the work of a very young man, is nevertheless in the right path).

From the cursory view we have, perforce, been obliged to take, we should be disposed to place "Simple," "Nil Desperandum," and "Classroom" as the most thoughtful productions in this very unsatisfactory competition, and perhaps the only ones of those we have noticed which could be executed for the money.

## ANOTHER ACCOUNT.

A visit to the Grocers' Hall to inspect the designs submitted in competition for the new Middle-class School to be erected at Hackney is not very likely to increase the confidence of those architects who make a point of "going in" for every building of importance for which designs are advertised.

It cannot be disputed that many of the younger members of the architectural profession are constantly competing, and in the above collection of drawings we recognise the distinctive design and draughtmanship of a greater number than usual. The forty-six sets of drawings submitted illustrate several excellent designs, but the way in which they are piled, as it were, on the tables, and under them, renders it extremely difficult to ascertain their respective merits, and we think that this, taken in connection with the refusal of admittance to the Press, will tend to create the impression that the Company fears that criticism which has proved so beneficial in all similar competitions.

A hurried glance is sufficient to convince one that some excellent designs must have been laid on one side on the score of cost, and



we were informed that the anxiety of the Company to do justice in this respect prompted them to employ a firm of surveyors to assist their architect in ascertaining the cubical contents of each design, and to put on one side those which would cost more than the £12,000 stipulated in the instructions, taken at 6d. per foot cube. We, however, feel sure that a number of the designs cannot be carried into execution for less than from 9d. to 1s. per foot.

The successful competitor, Mr. Theophilus Smith, has to congratulate himself on his good fortune in having devoted his time and skill exclusively to the general scheme of his plan, the simplicity of which is worthy of commendation. The arrangement of details he has altogether ignored, and in some instances doors are placed where the usual position for the teacher's platform and desk would block them up. The roof to the lecture-room and theatre, 76ft. in diameter, we noticed would be impossible to construct without the aid of supports, which are not shown. The elevations are Early Gothic in style, but of too ordinary a character to call for special remark. We give a sketch of the plans; for, without doubt, these alone have gained him the first place in the competition (c c c, Classrooms).

here submitted sustains his reputation. The plan is rectangular in form, the lecture-hall being on the first floor, which no doubt told against its acceptance. The style adopted is Queen Anne Renaissance, rather freely, but most artistically, treated, and beautifully drawn.

A design submitted under the motto "Scholasticus" is good in plan. The style of the elevations is of Queen Anne tendency, although the windows have pointed arches. That submitted under motto "To Suit the Site" has a plan of triangular form, covering the ground to an alarming extent. Another design, also planned on one floor, is noticeable for having bay windows to the classrooms to receive the master's platform and desk, thereby excluding half the class from the master's sight.

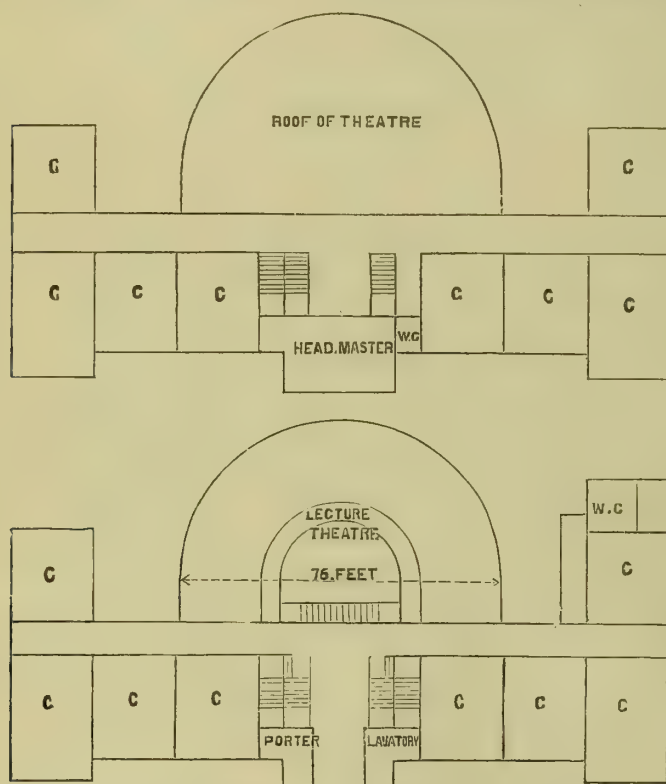
#### COLOUR.—I.

COLOUR is so often misapplied in works of art, from a want of knowledge of the effects of contrast or juxtaposition of shades and tints, that the eye becomes satiated or distracted, rather than pleased. Colour becomes music to the eye when harmoniously presented, though it frequently,

portance to the artist. It may be explained as follows:—If two stripes of unequal tints of the same colour be observed in juxtaposition, or two stripes of equal tints but of different colours, two of their edges touching, the eye will perceive certain modifications. In the first case of the two unequal tints of the same colour, the intensity of the tints will be affected, and in the second the colours will be modified, or there will be a contrast of tone and colour. Let four sheets of paper of equal size, two of grey and two of darker grey, be placed in juxtaposition. It will be found upon looking at the four sheets that the light grey contiguous to the darker shade is the lightest, while, on the contrary, the darker shade of grey farthest from the lighter grey will be the darkest; or if we call the two light grays A and A', and the two darker B and B', arranged also in the same order, A will be lighter than A', though B' will be darker than B. It will be found also that the modifications are not of the same intensity, but become less marked as the eye is removed from the boundaries of contact. The same sensible affection of shade or tone is perceived if a number of stripes of varying degrees of tone arranged in order from one side to the other of a piece of paper, is looked at. The stripes, instead of appearing flat, as flat tints, will appear channular or as hollows, each stripe presenting the greatest contrast of tone at the edges; the edge contiguous to the lighter shade will appear of greater tone than the edge verging on the next darker stripe, and so on throughout the series. The same effect takes place when colours are substituted, it being found that the modification of colours in juxtaposition is strongest at the contiguous edges or lines of contact, and weaker as they recede. This law we shall find holds good as regards colours. If we take, as before, four halves of two sheets of paper, and colour two halves of one colour, and the other two halves of another colour, but of equal intensity, and, arrange them as we did before; upon looking at the four halves respectively—*a, a', b, b'*—we shall find that the two *a, a'* differ, and the two *b, b'*; the two *a, b*, seem to have undergone a reciprocal modification of tint. For example, of red and orange, the red inclines to violet, the orange to yellow; of red and yellow, the red inclines to violet or is less yellow, and the yellow to a less red or green; of red and blue, the red approximates to a yellow and the blue to a green, &c. Thus, two coloured surfaces, viewed together, mutually tend to modify each other, both as to depth of tone and the ocular impression of the colours themselves, which seem to emphasise, by contrast, their opposite characters.

These facts, which can be proved, establish an important law for artists and colourists, though we often see it sadly violated as regards juxtaposition of colour. Chevreul thus enunciates the law—"When two contiguous colours are seen at the same time they appear as dissimilar as possible, both with regard to their optical composition and their depth of tone." Two colours seen together, *a* and *b*, will differ in the greatest degree when the complementary of *a* is added to *b*, and the complementary of *b* is added to *a*; it is found, indeed, that the rays of the colour *b* which *a* reflects when separately seen, and which are active, cease to be so when they are combined. Each colour loses what it has analogous to the other, and appears thus more contrastive. This simultaneous contrast affects at the same time the ocular impression of colours and their depth of tone, and that when colours are not of the same depth that which is deep appears deeper, and that which is light, lighter; or the former appears to lose white light, the other to reflect it more.

By the juxtaposition of coloured bodies the "law of simultaneous contrast" may be demonstrated thus, as shown by Chevreul:—Orange, the complementary of Blue, being added to Green, makes it *bluer*, or less yellow;



PLANS, PREMIATED DESIGN, GROCERS' MIDDLE CLASS SCHOOL.

In the two other premiated designs (the authors of which are to receive £100 and £50 respectively) more consideration has been given to working out the details in the arrangements, although the general schemes lack the simplicity of the design selected. That to which the third place has been given (submitted by Mr. Hooker) is in the form of an elongated H. A tower occurs in the centre, and the lecture and dining halls at either end, the connecting blocks being devoted to the classrooms. The elevations are Gothic, of simple character, with stone mullions to the windows and red brick facings to the walls.

It is noticeable that many of the designs are submitted by architects who have erected schools for the London School Board, and nearly all the competitors have adopted the dual arrangement of the desks in the classrooms. A set of drawings by Mr. Hall calls for special remark on account of the careful study given to all the arrangements, and the excellent draughtsmanship.

It is not difficult to identify the author of "Nil Desperandum," and the design he has

by harshness and arbitrary assemblages destitute of any principle, defeats its object, without satisfying or becoming either rich or pleasing. Our manufactures are often overcharged with colour, as if this constituted beauty; gaudiness and not harmony of combination has been aimed at, or at any rate has become the result of misapplied colour. We propose here to consider some of those universal laws of contrast which are daily violated in the art of decorative colouring or polychromy. We shall only consult authorities of high repute, or refer to them for proof of the principles here enunciated, presuming on the part of our readers some elementary acquaintance with colours in the abstract, as the composition of the solar light, its reflection by polished and other bodies, and the principle that the whole of the coloured light absorbed by a coloured body reunited with the whole of the light which it reflects, is equivalent to white light—or the principle of the complementaries of colour.

The law of the "simultaneous contrast of colour," as it has been called, is of great im-



again, Green, the complementary of Red, added to Orange, makes it *redder*, or less yellow. It has also been observed, *ceteris paribus*, that the modifications of contiguous colours will be more vivid as the complementary colour which is added to each of them differs more from it; but there are not any two bodies which present to the observer two pure and perfectly complementary colours.

Some colours are most nearly complementary to each other. Take Red and Green. Red, the complementary of Green, being added to Red, increases its intensity; and Green, the complementary of Red, added to Green, also increases its intensity. Theoretically and experimentally this is found true. Thus a yellowish green, placed side by side with a slightly orange-red, will make the red appear more orange and the green more yellow; if the same green be placed with a slightly crimson-red, the latter will be more violet and the green, bluer. An intermediate red is required also to assist the eye in discriminating the other two. Other examples might be given, though the result of observation is always conformable with the law.

A common effect of juxtaposition may be noticed as illustrating the modification of colour here spoken of. If we colour upon a white sheet of paper eight circles, about 1½ in. diameter, of the following colours, red, green, orange, blue, greenish-yellow, violet, indigo, and orange-yellow, each circle of colour being separate, and tint the white paper around the circle with its complementary colour gradually softened off, the following results appear:—The Red circle appears to tone the surrounding space with its complementary colour, Green; the Green with red; the Orange with its Blue, and so on.

Again, the combination of coloured surfaces with white produces modifications of great value to the colourist. A sensible difference is created, the tone of a colour is visibly heightened by contiguity to white. If Red and White be taken, and Green, the complementary to Red, be added to White, the Red becomes deeper and more brilliant; and also if Orange and White be taken, and Blue be added to White, the Orange appears deeper and more brilliant; and the same effect will be produced in other colours with white. These contrasts are of infinite value in all coloured objects and decorations in which white spaces intervene or largely predominate.

#### SANITARY PROGRESS AND THE ARRANGEMENT OF HOUSES.

**S**ANITARY progress has been seriously checked by the divided jurisdiction of sanitary authorities throughout the country. The Public Health Act, 1872, while it retained the existing local authorities and placed them under a general system of administration, failed to see the effect of dividing the country into urban and rural sanitary authorities, entrusted with different powers and constituted in divers ways. The consequence is now felt. Petty rural and urban Boards are in perpetual conflict upon vital points, and comprehensive or economical administration is impossible. Thus we have a few small towns under urban sanitary rules, others under rural jurisdiction. Whole parishes, towns, and suburbs, labour under a disjointed system of sanitary government, sometimes being under rural, sometimes under urban laws. Local Boards and Boards of Guardians, too, are often squabbling over some point of sanitary efficiency, or it may be, even of jurisdiction. Diverse interests and politics interfere with the efficient administrative power necessary, and opposite codes of regulations prevail. We do not mean to say that in some instances sanitary authorities, as constituted, are not composed of enlightened and public-spirited men; but as a rule it is not so. In a pamphlet before us, published by the Manchester and Salford Sanitary Association, being an address on "Local Government and Sanitary

Law Reform," by John Lascelles, Barrister-at-law, a central supervising authority on sanitary matters is referred to, under whose control and supervision all local authorities should exist. There is a feeling of repugnance to centralisation by all local authorities, and local self-government is rightly regarded as essential to national freedom. We believe that to diminish in any way the authority of local boards would be a mistake; it would only increase the labour of a central power, and we agree with Mr. Lascelles in his opinion that our local administrative machinery should be of sufficient efficiency to reduce this labour. Larger areas would obviate the evils of selfish interests and petty prejudices, and would also make seats on such Boards more prized by educated and able men. Mr. Lascelles says that county councils would be beyond the influence of petty interests; perhaps he is right, if the elections were properly looked after and supervised by a Central Board. There can be no question as to the desirability of widening the basis of local sanitary authorities. We have always maintained the necessity of making every district responsible for its health; that every occurring instance of self-propagating disease, as fever, small-pox, &c., should, under penalty, be notified to an official or medical officer of health; and to accomplish such a plan, local districts should form the staple of such proposed boards.

Such supervision would stop the concealment of special maladies in a family, for every doctor should make it a statutory duty to report such cases to the sanitary authority. By such a machinery the central medical department would have full cognisance of the sanitary state of every district; so that inquiries and the concentration of sanitary science could be brought to bear upon the locality with all the certainty of success. Again; it was shown by a medical lecturer, the other day, that a single vagrant suffering from a mild form of typhoid may contaminate the water-courses of half a dozen localities, and that the steps of such a wanderer should be arrested. Mr. Lascelles proposes similar measures, namely, "All cases of fever or any other infectious disease, shall be speedily brought under the notice of the sanitary authority" of the district. "That medical men attending such cases shall be bound to give immediate notice thereof to such local sanitary authority;" and that they shall make known to the inmates of such house the infectious character of the disease, so that immediate precautions may be taken to prevent its spreading. When no medical man is in attendance, the persons in charge shall themselves give the notice to the local authority. "Every local sanitary authority receiving such notice shall immediately send printed directions as to the disinfecting of clothing, &c., and as to precautions which should be taken to prevent the spread of infectious diseases, to the person in charge of the house." These directions to include various methods of disinfection of simple and inexpensive kinds, drawn up under the supervision of the medical officers. "At intervals of not more than ten days from the receipt of such directions, such person in charge shall send to such local sanitary authority the certificate of a qualified medical man that the directions have been properly acted upon;" and this to continue till a certificate that no person in the house is ill of fever or any infectious disease has been received by the authorities. This is the gist of the proposals of Mr. Lascelles, and in view of the outbreak of typhoid last summer at Marylebone and other places, and our proximity to the hottest months of the year, we think such precautionary measures absolutely necessary for public protection. In the outbreak referred to, the milk supplied from Chilton Grove Farm was stopped by the Dairy Reform Company, and the fever abated. The lesson is instructive.

Another pamphlet is before us, entitled, "Arrangement of Houses considered in reference to Sanitary and Artistic Requirements," and read before the Belfast Architectural Association this year. In Dr. MacCormac's pamphlet the subject is discussed under the different heads of air, water, sewage, light, warmth, convenience, and grace. Under the subject "Air," we are given a hint for windows, though we hardly understand by the description given what is meant. We quote the passage: "Windows, then, I would have constructed three parts of sheeted glass, with guard outside, to open like a door below, while the upper part provided with large sheaves, should be made to pull down, like the ordinary guillotine sash, above. The glass in such casements it would be safe and easy to keep bright and clear, while the casements would be readily thrown open for the ample admission of air." The upper portion of sash is proposed to be duplicated by hinges, weights, and cords, in such a way that when the sash was pulled down, "the indraught should be directed towards the ceiling, and not upon the heads of the inmates." We are told this arrangement has been adopted with satisfactory results. Sufficient provision for renewed and pure air is not attained in our houses. We erect barriers of wood and stone and glass to shut out ozone and oxygen.

As to water, we are told we need about 3½ lb. daily in some shape, for it constitutes six parts out of seven of the living organism. Soft water is recommended in preference to hard, as more suited to organic requirements and for food. Rainfall is, as Dr. MacCormac observes, not stored to the extent it should be by us. Few houses provide for storage either by tanks or butts, while it may be invariably done at little cost. The objection entertained to rain-water is that it passes through smoke and organic matter in conveyances as pipes. This need not hinder us. We can use carbon filters or the siliceous slabs of Messrs. Ransome and Co., by which it may be rendered perfectly clear and tasteless. Slate, stone, earthenware, or iron tanks could be used.

Sewage and sewage culture are glanced at; and a compost termed a sanitary "humus," consisting of brick or dry earth mixed with 10 per cent. of gypsum, 5 per cent. of alum, 5 per cent. of sulphate of iron, or copperas, and 5 per cent. of free sulphuric acid, is recommended. A bin containing this mixture in sufficient quantity to last six or twelve months is suggested to be placed in the attics of every house with valved shoots to the closets and temporary receptacles below. We endorse the idea, though not a new one, and in some districts, we think such a plan would be highly advantageous and remunerative. Light, and colour also, the author mentions as conducive to health. On the subject of "warmth," he introduces a fire-grate, though he modestly admits—which is a lesson to other patentees—that it is partly founded on one introduced by Cardinal Polignac, some 200 years ago, and recently reintroduced by Captain Galton, with important modifications. The stove grate advances well into the apartment, and is composed of fire bricks covered with majolica, porcelain, or marble, &c. The back of the fire-place is of iron; behind the fire, and extending partly up the smoke flue, is a hot chamber, into which, through drains or flues from the outside, air is admitted; and which after being heated is discharged into the room by valvular openings. One of the fireplace jams is carried up to the ceiling, hollow, the opening being concealed by the cornice, while the aperture in the hearth is so managed that when the fire is closed by a tale or glass door, the fouled air of the room supplies the fire. Again, the vitiated air of ceiling is also drawn down through the jamb, to aid the supply, and thus while the heating apparatus at floor and ceiling is drawing off the foul air, the



hot-air chamber is replenishing the room with fresh. Dr. MacCormac claims for this plan that at least twice the cubic quantity of air will pass each minute up the flue that is ordinarily drawn.

"Grace" forms another heading of this brochure. Green trees should grow in every thoroughfare, and pictures, or good chromos and statues, decorate every room. The Italian style is preferred by our author, with its balustrades, campaniles, and tiled roofs. Houses, *fac similes* of each other, and interminable rows, are condemned; no two houses should be alike. Normandy, and the Low countries are given as instances of variety. We cordially re-echo the assertion that "our cities and towns are flagrantly deficient;" and while we devoutly wish these ideas of Utopian perfection to be realised, we must first put our shoulders to the wheel of sanitary improvement.

### SEPULCHRAL STRUCTURES.

AN extraordinary interest has been aroused in this and kindred subjects by the revived arguments for and against cremation, or the burning of the dead. On the one hand, there is a natural, powerful, and, it would appear, ineradicable sentiment, combined with strong religious compunctions, hostile to the funeral pyres of Paganism; on the other, it is affirmed that the change proposed would be for the advantage of the living, because modern ingenuity has failed to discover efficient mortuary arrangements, especially with reference to tombs, vaults, and other depositaries. Of course, the text-book of the whole discussion is Sir Thomas Browne's "Hydrotaphia," or "Urn Burial," a work suggested by the opening of certain mounds in Norfolk about the middle of the seventeenth century. The learned Doctor was an enthusiast on his favourite topic, went backwards and forwards in history, and over all the then known regions of the earth, to prove that interment, though a primitive, was also a savage practice; but he failed to show that cremation was ever a Christian custom, or that the general instinct of mankind ever favoured it. But it is unnecessary to debate the point, except in so far as to remark that the Hydrotaphian system gives much less security to the sanctity of the grave than any other, since scarcely a museum exists which does not contain its hundreds or scores of cinerary urns, whence the ashes have been profanely scattered. Nothing more is required than to glance at records upon this topic, and then pass to the more practical consideration of the defects in the structure of modern tombs. Every classic manual describes the fiery funeral rites, in the earlier periods, of Greece and Rome; and it may be presumed that no work, erudite or popular, has been written on Indian manners without an account of the flaming stake upon which, until lately, the widow perished with her husband. The bodies of Kings were wrapped in unflammable cloth, so that the poor relics might be preserved separate from those of the slaves and captives sacrificed on the same altar of mortal pride. Neither infants who died before cutting their teeth, nor persons struck by lightning, nor suicides, were entitled to these obsequies, which expressed the true spirit of Paganism, and will probably be long before they recommend themselves outside of a very narrow circle in Christendom. At the same time, it must be conceded that an impulse of the human mind, in all ages and countries, has led it to contemplate a preservation of what remains after life, so that the idea of decay shall be, as far as possible, shut out, and a grandeur conferred upon the homes of death. For this reason, there can no longer exist a doubt, the Pyramids were erected; the tombs of Upper Egypt were hollowed in the solid rock; sarcophagi were cut in stone so ponderous and massive that no sacrilege could

assail them; and, above all, the embalming of mummies was resorted to as preserving a semblance of the vital form. Precisely the same ambition runs through the rock-hewn tombs of India, Etruria, and the land of Moab, and, in later days, the palatial mausolea of Agra and Delhi. In these the survivors sought to confer a brilliance, and even a gaiety, upon the dwellings of the dead; they laid them in caskets of exquisite design; they spread above them floors of sparkling mosaic; over these they reared arches of pleasure, as though the edifices were to be paradises of pleasure rather than the solemn abodes of silence. It is singular to note, indeed, that while these structures are cupolad, minaretted, and gilded, up in that brighter region, the lofty sepulchres of the Southern Peninsula are actually called, in the native vernacular, "Towers of Silence"—vast, black, martello-shaped, and regarded with superstitious dread by the country people for miles round; and this notion of protecting the last sleep of humanity is so universal that there is not a zone of the globe in which we do not find it—in China, in Tartary (though there cremation is still partially practised), among the Red Indians and the ancient Aztecs, and even in every cairn and cromlech of the British Islands. In each cromlech, buried deep among the stones, was a small chamber, or sarcophagus, intended as a grave, and infinite pains were taken to render the spot inaccessible. How futile were these efforts may be judged from the example of India, where, as in the Punjab, tombs which were the pride of their architects have long been swept clear from the dust of their inmates and appropriated to modern uses. Thus, the Protestant church at Lahore is a tomb; the resident British Secretary, and a whole phalanx of other British officials, inhabit handsomely furnished tombs; their horses are stabled, and their meals are cooked, in tombs. War began the process, but the impious hand of antiquarianism has completed it; and not even those huge mausolea in the Central region which the traveller, at a first glance, mistakes for citadels, have stood inviolable, notwithstanding the thickness of their walls, the depth at which their vaults are buried, or the secrecy of their sepulchral chambers. They who rifled the catacombs on the banks of the Nile were not likely to spare the crypts of Central India. In Christian countries fewer attempts have been made to ensure an impossible durability. Tombs have owed their preservation more to a kind of religious, combined with an artistic, sentiment, than to the massiveness of their masonry or any subtle contrivances of their builders. No rivalry has been attempted with the historic piles dedicated to Caius Castres, the Horatii, Adrian, or Cecilia Metella; but in Europe, nevertheless, have been constructed many mortuary edifices worthy of all fame, which would be sorely missed from the art panorama of the only continent upon which true art has ever flourished. The tombs of King John and Philippa of Lancaster, at Bathalla; of De Velasco, a wonderful example of the Flamboyant style, at Burgos; of the Alphonsos and Inez de Castro, at Alobaca, with their magnificent straight-sided arches; and those of the Scaligers, containing a history in themselves, and surrounded by almost equally beautiful specimens, are the shrines of all travellers. Of course, were the method of cremation adopted it would not follow that architectural tomb-building must cease, because the monument of Queen Elizabeth, cumbrous and confused as it is, with its variegated marbles and alabasters, its black and white columns of different orders, its blaze of armorial bearings, and its elaborate entablature, might as well contain an urn as a coffin; but it may be suspected that a system of semi-open sepulture would speedily supervene, more or less repugnant to the sympathies of a Christian epoch. The great Minster is rich in illustrations of our subject.

The shrine of the Confessor, long ago stripped of its splendours; the tomb of the Third Edward, rich with sculpture; that of the Second Richard; and that world-celebrated work in which repose the remains of the Seventh Henry—described by Lord Bacon as the "stateliest and daintiest in Europe." Rarely has the Italian genius so far, so boldly, and so brilliantly, burst from the fetters of conventionality as in this marvellous monument, which, however, is too familiar to need dwelling upon in detail. There is no equal, or rival, to it, and the chapel which is its casket, in the world—not even in the capital of the Moguls, notwithstanding that they built upon a mightier scale, and with more dazzling materials. With reference to the City Cathedral, splendid though the structure be in itself, the only creditable tombs it possesses are buried out of sight in a dismal and unclean crypt, instead of adorning and ennobling the edifice, as the Invalides, at Paris, are ennobled and adorned by the Mausoleum of Napoleon and his marshals. The French have something approaching to a parallel with Henry the Seventh's Chapel at St. Denis, which was, for centuries, the privileged burial-place of French kings and queens; but the artists were comparatively inferior, and restoration has done more even than dilapidation to disfigure the royal tombs. They never equalled, moreover, the superb sepulchral monuments of Rouen—works of a high and genuine art, involving sculpture no less than architecture. Still, the memorials of Dagobert and his consort; of Louis XII. and Anne of Brittany; of Katherine de Medicis; of Francis I. and Queen Claud; and of Duguesclin, though shattered and despoiled, are of great historic interest. But they illustrate the remark that no sanctity of cathedral or church, and no contrivances of the builders, can secure the homes of the dead, any more than those of the living, from ravage. There are fifty-one royal tombs at St. Denis. They are all empty, ransacked by the Convention of 1793. Within three days they were opened, their contents dragged forth and cast into pits, and left as gaping voids until more decent principles reigned in France. Similar remarks might apply to the tomb architecture of Germany—that of the north parts more particularly; but it is possible to conceive that the subject of cremation could wait while we reformed the so-called sculpture in our cemeteries. No spectacle more heterogeneous and yet more monotonous can be presented to the eye than an English necropolis, excepting, perhaps, a Turkish burial-ground. A random assemblage of broken obelisks, overgrown genii of grief lolling over funeral inscriptions, canopies resembling Parisian hearses, slabs remarkable for nothing but size and weight, "imprisoned within black purgatorial rails" or chains, inverted torches, pyramids, mimeries of Egyptian tombs, with doorways appropriate enough to the architecture of Thebes or Dendera, but wholly out of place at Highgate or Kensal-Green; things intended to be urns but rather resembling tureens; preposterous variegations of stonework—in fact, every medley of grotesque that can be ordered of the mason who styles himself a sculptor. Not but that an occasional instance of poetry and purity occur to vary the tasteless and meaningless display. They, however, through their very modesty, are lost amid the general barbarism, in which vulgarity, ostentation, bad taste, and blindness to every idea of artistic propriety and the fitness of the object to the sentiment it is supposed to embody, run riot without a censor to check them. Half of the more elaborate designs are pagan; many are even heathen. For once, however, we are certainly bound to confess the French to be worse than ourselves, since anything more tawdry or sentimental than a French cemetery it is impossible to conceive, unless where the element of ghastliness enters, in complete accord with the national character. —



## THE FIFTH ANNUAL EXCURSION OF THE ARCHITECTURAL ASSOCIATION.

IT has been the privilege of the Architectural Association, for some years, to be conducted on its annual excursions by Mr. Edmund Sharpe, M.A. Mr. Sharpe, we may say almost for the last generation, has rendered signal service to Architecture. He has done so by elaborate and substantial publications, by exhaustive papers before our Architectural and Archaeological Societies; and as "guide, councillor, and friend" at Architectural excursions. In fact, no man living is doing a completer or more unique work in the way of promoting Architecture in England, than Mr. Sharpe. By these annual excursions alone he is creating an interest and evoking a spirit in favour of matters architectural that could not be done so successfully in any other way. Possessing ample means, a rich store of knowledge, a warm and generous disposition, and a strong enthusiasm, he places them ungrudgingly at the service of our young and rising architects, and we are glad to know that many of them are profiting by his instruction and example. This year Mr. Sharpe has undertaken to accompany the members of the Architectural Association to France, and no doubt a varied treat is in store for those who are so fortunate as to go with him. The following is the programme:—

Monday, August 17th, 1874.—The party will leave the head quarters for the Excursion,—Hotel Buckingham, Rue Pasquier, Paris, at 8.30 a.m., and will visit the following Churches: St. GERMAIN des PRES; LA SAINTE CHAPELLE; NOTRE DAME; Chapel at VINCENNES.—Sleep at Paris.

Tuesday, August 18th.—Leaving at 8 a.m. by carriage, the following Churches will be visited; (viz.), St. DENIS (Abbey Church), Church of GONESSE, CATHEDRAL of SENLIS, and the Churches of St. VINCENT, ST. FRAMBOURG and ST. PIERRE at Senlis.—Sleep at Senlis.

Wednesday, August 19th.—Leaving Senlis by carriage at 8 a.m., the party will proceed by way of CREIL, MONTAIGRE, ST. VAAST, and MELLO, to CIREN, where they will take the train to Beauvais. The rest of the day will be spent at BEAUVAIS CATHEDRAL, and the Churches of ST. ETIENNE and LA BASSE-ŒUVRE.—Sleep at Beauvais.

Thursday, August 20th.—Starting at 6.55 a.m. Ciren-les-Mello will be reached by rail; and taking carriage there the party will visit the Church at BEAUMONT-SUR-OISE; and proceed by way of CHAMPAGNE, JOUY-LE-COMTE, AUVERS and TAVERNY to Herblay Station, where the train will be taken to Pontoise.—Sleep at Pontoise.

Friday, August 21st.—ST. LEU D'ESSERENT will be reached by train starting at 6.43 a.m. The party will spend three hours there, and return to Pontoise and visit the Churches of ST. MACLOU and ST. OREN and the abbey of MAUBISSON; and return to Paris.—Sleep at Paris.

Saturday, August 22nd.—This day will be devoted to a visit to the CATHEDRAL of CHARTRES, and the Churches of ST. PIERRE and ST. ANDRE in that City.—Final dinner of the Excursion at 6 p.m., at the Hotel Buckingham, Paris.

As several Members who intend joining the Excursion are desirous of extending the term of their visit. Mr. Sharpe, with a view to meet their wish, sketched out the following programme, and has stated that he will accompany them. If any others, who take part in the Excursion, wish also to prolong their visit, and to join the company, and will state this at once to the Secretaries—some special arrangements will probably be made for their accommodation.

Monday, August 24th.—SOISSONS. The Cathedral and the Churches of St. Pierre, St. Leger, and St. Jean des Vignes.—Sleep at Soissons.

Tuesday, August 25th.—LAON. The Cathedral, and the Churches of St. Martin and Vaux sous Laon.—Sleep at Rheims.

Wednesday, August 26th.—RHEIMS. The Cathedral, and the Church of St. Remi.—Sleep at Rheims.

Thursday, August 27th.—CHALONS. The Cathedral, and the Churches of Notre Dame and St. Alpin.—Return to Paris.

Friday, August 28th.—EVREUX. The Cathedral. ROUEN: the Churches of St. Ouen and St. Maclou. Sleep at Rouen.

Saturday, August 29th.—ROUEN. The Churches of St. Godard, St. Laurent, St. Vincent, St. Vivien, St. Georges, St. Eloi and St. Lo.

N.B. The words in capitals show the buildings it is intended to visit. A time table similar to those furnished in previous years will be issued. Members will find it convenient to keep their baggage a minimum quantity, and in an easily

portable form (knapsack, &c.) during the days of absence from Paris (18th to 21st August). Communications should be addressed to S. Flint Clarkson, Edward G. Hayes, Hon. Secs. 9, Conduit-street, Regent-street, W.

TWO EUROPEAN SCHOOLS OF DESIGN.  
(From the *Atlantic Monthly*.)

## I.—SOUTH KENSINGTON.

IF the artistic genius of England were to be judged by its art institutions, its position, already not too high, would become ridiculous; for the occasional individual examples of genuine art-feeling which crop out of the mass of stolid indifference to art seem never by any chance to diffuse their influence into the educational system. In artistic countries we see schools gathered together by the magnetism and genius of individual masters, and the best talent almost invariably more or less devoted to the perpetuation of its traditions; but in England, almost without exception, the men who have real talent put it in the market for what it will bring, without a trace of the generous enthusiasm which one finds in the great Continental ateliers. Artists thrive in England commercially, though art starves, and pictures are sold in quantities and at high prices, and now and then a genuine and remarkable artistic nature does appear; but in general, art as art does not enter into English education, or exercise any influence on it. I must not forget to notice one exception quite worthy of the artistic *confrérie* of the old times—Ford Madox Brown, the well-known "Pre-Raphaelite," whose knowledge and time have always been given freely to art-students.

A popular superstition prevails in England that to have art you need only to have art-schools; whence South Kensington, with numerous tributaries, and yearly competition and prizes: and as the popular mind is tolerably indifferent to the quality of the art, and the legislative mind utterly in the dark as to the measures to be taken to encourage it, the result has been that South Kensington is a huge receptacle into which everything notable in applied art drifts, and where it lies, the object of indiscriminate and undigesting admiration. I believe that in the course of generations these superb public collections will develop taste, perhaps an art; and if artists arise in England capable of teaching on correct principles, and with a notion of what art really is, there may be created a school; but meanwhile we have—South Kensington.

Last September I looked through the annual exhibition of prize drawings for the national competition, and a more hopeless mass of childish, misdirected patience and microscopic enthusiasm I have never seen. The system of study followed, if it deserves to be called system, seems to be analogous to what geography might be as studied by pismires—the attempt to crawl over and investigate at near sight every point and detail of the subject, without in the least comprehending the larger relations of it, much less the rhythmical tendencies; in fact, such a mapping of nature as a somewhat intelligent photographic machine would do if left pretty much to itself. Sign of masters or proof of mastery there is none; and of the three general divisions into which the work may be divided—drawing from the east, from the life, and from nature and decorative design—I was not able to discover a single example which showed the least promise of originality, or betrayed a comprehensive way of looking at things. The drawings from the east were, in the specimens selected for the chief prizes, mainly distinguished by the carefulness and lithographic quality of the execution, all point-work, and painful from the excessive attention to the most minute markings and little fractures in the plaster of the original, and the laborious way in which a flat background was laid in, stippled, and pointed up like commonplace engravers' or lithographers' work. A plaster cast is a good sitter, and the worst lesson in the world; but at least a draughtsman ought, with time and patience, to be able to rival the photograph in exactitude. Not one of these drawings of antique statues, however, showed more than a superficial apprehension of the original. The clear quality of the lines was gone; the muscle markings were all there; the pose and action no one could miss: but the subordination of detail to the action, and to the larger masses, was lost entirely; the outlines were hesitating and undulating, without expression, weak, and flabby. Through all the spiritless manipulation one felt that the object was seen by

its details more than by its *ensemble*; that the feeling which lay at the root of the work was, Get the details right and the masses must be right—a superficial maxim, and one that is invariably falsified by practice; for no one ever does get the details absolutely right, and the sum of the errors is worse than any possible error in the larger way of working. The French system, the only correct one in use nowadays, is to get your ensemble at once and without reference to detail; your "motive" fixed, you may go on and add detail as long as you like; but the artist's work must be like the creation, first divided by the broadest demarcation. Any system of drawing not based on this principle will be wasteful certainly, weak probably, and invariably inaccurate. And it is not at all in the practice of working with the point of the crayon that the error exists, any more than inaccurate grammar lies in a bad pen. A good draughtsman, whether he begin his work with chalk, with a stump, as in most French schools, or with a huge hog tool, will invariably work largely, while the South Kensingtonian will blunder without his point because he has learned to see nothing but detail, and the stump or the brush is too large for his facts.

But if the system of building up by detail be unfortunate in statuary even, what will it be with the mobile and easily-tired living model? Here Rousseau's precept, "If your picture is not made in the first five strokes, it never will be," is absolutely true. If the motive of the drawing, the character of the figure, is not caught in the first few strokes and the first few minutes of the pose, it will never come right; and so all depends on the rough cast, the blocking out, of it. And the South Kensington system betrays its votaries from the beginning, for it does not lead them to look mainly at this larger truth, without which all addition of facts is decoration without meaning, and finish without structure. There were no figures in full from life, but a collection of studies of heads was just what we might have anticipated from the errors of system followed in the antique; not one was there which would not disgrace a French student three months in the atelier. It is not that there was no genius (if there were, it would not find its way through these sophistications), but there was an utter want of style and breadth in the drawing—all the petty points of feature elaborated and likeness hunted out with the eyes of a ferret, while the solid and plastic qualities, the roundness and large contours, were utterly lost sight of; detail protruded everywhere—hard, liney, and anatomical.

The studies from nature similarly had the character of botanical studies. There was no limit, except that of eyesight, to their faithfulness, but there was no artistic relation in them. If training is wanted for scientific draughtsmen in botany and inanimate nature, here it is; but one need not have South Kensington for that; it wants neither method nor masters nor public competition to bring it out, the true pismire habit is perhaps the best for it.

There remains only the decorative design to be considered. Here I failed to find anything beyond ingenious adaptation of the styles of ornamentation so well known, Persian, Italian, Morris and Co.—nothing equal as decoration to Japanese either in form or colour, the best in colour being some that were very like Morris and Co.'s designs for papers. There were conventional styles of decoration in which the daisies are a little more realistic and the climbers and creepers more botanical, but this is, except for a naturalist's eye, rather an objection than an excellence. The essence of all good ornament is that it should be felt as ornament merely, not as natural history. There must be a certain conventionalism of type in the forms if the forms are borrowed from nature; but the noblest schools of decoration have always based their work on abstract or geometrical forms, and only unartistic people, or those with whom art has gone to decay, adopt naturalistic types with realistic treatment. A strongly realistic tendency is the worst possible symptom in a rising school and in the whole history of the world there is no example of a noble school of art growing out of imitation of nature. A certain affectionate representation, far off and fantastic, with a strong subordination to the first motives of the work, have always attended the introduction of nature into the great schools. It is only in the English school that we have even the ornamental arts made intentionally realistic, and the ensemble sacrificed to the parts.



There were designs for fans in which the French of Louis XIV., or the *salon* style, was most appropriate and equally good with any. But in all, the principles of art were not so much as recognised. Now, the larger question at once arises, if, when art is to be cultivated, even for ornamental purposes, it is not better to lay the basis in the practice of the better style of design; and whether, if the commercial demand for ornamental designs alone were to be consulted, it is not wiser to aim at making artists (so far as training can accomplish that end) even for our house-papers, than to adopt a system which may make clever draughtsmen, but never will help make a true designer? Vulgar and uneducated tastes are caught by the recognition of the little facts of nature, and delight in being deceived by that artifice which they mistake for art. The study of nature is not necessarily art, but it is made artistic by a proper method, as we shall see in examination of the Belgian schools.

## II.—THE SCHOOL OF ANTWERP.

The course of instruction in the Academy of Antwerp is substantially in preparation for the higher branches of art-production, although the plan of organisation extends over all the occupations in which design is applicable: painting, historical and genre, ornamental design, landscape, and animals; sculpture; architecture; shipbuilding; and engraving. The course is divided into elementary (comprising linear drawing of ornaments, heads, and figures, and geometrical drawing; ornaments, heads, and figures in light and shade, and orders of architecture), from which the pupils pass into the middle classes (*enseignement moyen*) by a competition in which they must satisfactorily acquit themselves in the execution of a drawing or model in the branches for which they compete, without assistance or direction, to show that they have thoroughly mastered their material, their subject being a print or cast. In the middle class the modelling or drawing is from an antique statue, from nature, with studies of expression, &c., in the classes of painting and sculpture; in architecture, of the principles of construction; and in engraving, of the different styles of copper and steel plate engraving and wood cutting with modelling in wax for medals, &c.

The competition for passing into the upper class is in the execution of a figure from an antique statue; in architecture, of a design for a dwelling-house, &c. There are, beside, competitions in costume and knowledge of antiquities, anatomy, proportion of the human body, perspective, linear and picturesque, expression and geometry considered as accessory, and in the different branches of application of art to industry.

The plan of organisation is very large and comprehensive; to carry it out in all its branches effectively would demand resources greater than any government has yet seen fit to devote to such an object; but beside being the central institution of 46 academies and schools of design in the different cities of Belgium, it has in its own schools given instruction in the last ten years to nearly 16,000 pupils, of whom 47 were from the United States, and of them one, Mr. Millett, of Boston, is recorded in the last report (1873) as having taken seven first prizes out of eleven given in the department of painting and drawing of the highest classes. The staff consists of the director, De Keyser, and twenty professors. The primary classes were not in train when I visited the school, but of the evening classes, to which the artisans and apprentices of Antwerp come in great numbers, all instruction being free, that of architecture was by far the most striking, from the number of operatives of different occupations who come to receive an education which they may carry as far as their talents permit them. Of the total of the students in the academy last year (1872-73) 162 were decorative painters, 308 carpenters and cabinet makers, 77 stonecutters, 63 plasterers and masons, 20 goldsmiths, and 32 other metalworkers, beside representatives of nearly every trade in use in the city, about 560 being undetermined yet as to their future careers.

The system of drawing is similar to that so long established in France, and in principle the antithesis of that employed in England. The pupil is taught to look mainly, in the antique school, for the individual character of the statue employed as model, and to render this in the drawing, beginning with the largest relation and carrying the elaboration on in all parts more or

less *pari passu*, so far at least that no part shall be finished in advance of the whole. In the life school not only is this throughout insisted on, but the more difficult feat of catching the motive of the pose, and expressing it in the fewest and largest lines, is kept constantly before the pupil, for the double reason that the model soon loses the pose from weariness, and the draughtsman himself, if he does not catch the pose at once, is less likely to get it with each successive alteration; and the larger and simpler the cast of the outline, the more likely it is to give the essential character of the action. The pupil is taught, in other words, that the less his eye is diverted to details, the easier and truer his generalisation is likely to be, and that no amount of detail will compensate for the loss of the general fidelity.

Some drawings which are hung in the classroom are admirable examples of the results of the system—outlines pure and clean, anatomy well developed, and the larger qualities of form underlying the expression of all the surface markings. There was not as much recognition as I have been accustomed to see in some of the French ateliers, of the distinctions of local colour in terms of black and white, but it is a moot point amongst even good draughtsmen how far this should be carried, some preferring to render the forms as if they were monochromatic as in the plaster cast, others noting local colour in equivalent of tint in the monochrome, much as the photograph renders it. The latter seems to me the true system, and certainly the most expressive and effective drawings are obtained in this way.

The drawings for the competition, such as those I saw in the classroom, are done without any assistance or advice from the professors, and so represent truly the attainment of the pupil. There are, beside drawings from life, anatomical studies in which the student can have no assistance even from diagrams. The professor makes a number of small sketches of figures in certain attitudes, and draws from them by lot those which must be the basis of the anatomical study, for which the pupil has no other guide than this sketch. He is shut into the drawing-room and must in twelve hours make a study showing all the anatomical developments in a figure taking that attitude—one drawing for the muscles and another for the skeleton. For the drawing from the cast he is allowed eight sittings of two hours each, and that from the living model ten, at the end of each of which sittings the drawings are put under the seal of the academy and kept so until the next sitting.

There is of course a certain degree of apprehension to be felt that such a vigorous system of positivism in artistic education would produce an academic rather than an individual development; but the director, though a master of all that pertains to academic art, is well aware of this danger, and knows that any indication of individuality must be protected and fostered as far as is consistent with sound knowledge and thorough draughtsmanship. The talent must be of a very weak order of individuality—hardly in fact more than an eccentricity—which will not be bettered by the system of instruction followed at Antwerp, which seems to me, so far as plan and scope is concerned, very nearly if not quite all that an institution of this kind can be made. Beyond this what may be realised is in part dependent on the means afforded, and in part on the assistance of collections of good art, in which it must be said Antwerp does not rival most of the artistic cities of Europe. In some respects the favourite French custom of the leading artists teaching the aspirants in their own school is pleasanter, but it may be seriously questioned if the magnetism of a great genius, and the fascination of his results, may not be more dangerous to individuality and real rising genius than all the rigidity of an academic system. Few artists of great and peculiar powers have been able to lay down a plan of education which would adapt itself to widely different talent, and rarely have they succeeded in making worthy followers. The best painter is often far from being the best teacher, and indeed is rarely able to tell the reason of his working, while many a man of mediocre artistic powers has succeeded remarkably well in forming the talents of men of widely diverse character. I think that the experience of the world will prove that a good educational system like that of Antwerp, even if it possess no peculiar talent in its direction, is better than an individual influence, whatever may be its power or attraction. W. J. STILLMAN.

## THE ROYAL GOLD MEDAL (1874) OF THE INSTITUTE OF ARCHITECTS.

PROFESSOR RUSKIN having thought proper to decline the Gold Medal, on the ground, it is said, that he considers the present state of architecture to be so unsatisfactory that he cannot admit the right of the Institute to bestow, nor of any individual to accept, any medal or other acknowledgment for services rendered to architecture in the present day, the matter has been for some time in abeyance, but it is now announced that this year's Gold Medal, rejected by Professor Ruskin, is to be offered to Mr. G. E. Street, R.A. A special general meeting, of Members only, will be held at the rooms of the Institute on Monday, August 17, at 8 p.m., to consider the following recommendation of the Council with regard to the award of the medal:—"That the Royal Gold Medal for 1874 be awarded, subject to her Majesty's gracious sanction, to George Edmund Street, R.A., Fellow." The convening of this meeting has been deemed necessary by the Council in consequence of a letter received from Sir Thomas M. Biddulph, K.C.B., communicating the Queen's pleasure that, under the circumstances announced at the last general meeting of the Institute, another recommendation should be made to her Majesty as to the award of the Medal.

## TAYLOR'S IMPROVEMENTS IN METAL ROOFING.

MR. TAYLOR, of Snow-hill, Birmingham, has sent us some particulars of his new system of constructing and fixing sheet metal roofing, which appears simple and dependent on correct principles. His method is to make in the roofing-plate two or more hollow ribs or projections open at the bottom, at the same distances apart as the rafters to which the roofing is to be applied. The heads or closed tops of these projections are angular or nearly lozenge-shape in cross section. Upon the top of each of the rafters of the roof is fixed a dovetail or angular metal seat, having in cross section a nearly triangular figure. A base plate, which is fastened to the rafter, is thus made, provided with inclined sides constituting a dovetail or inclined seat, the inclined sides of the seat having a shape and size proper for the upper sides of the angular head of the hollow ribs or projections of the roofing plate to engage with. In fixing the roofing-plates to the roof, the angular-shaped heads of the ribs or projections are engaged by a sliding motion with the fixed dovetail or inclined seats on the rafters, the seats being completely covered and protected by the heads of the ribs or projections. The roofing-plates are prevented from rising vertically by the engagement of the angular-shaped heads described with the fixed seats on the rafters; and from sliding off the seats, by a flange on the end of each plate being nailed or otherwise fastened to the rafter. The flange described at one end of each roofing-plate is covered by the head of the rib or projection of the next roofing-plate. By this method the parts used for connecting the plates to the rafters expand and contract equally, and the nails or screws used are concealed and protected from the weather by the connecting parts of the roofing-plates.

GROCERS' MIDDLE CLASS SCHOOL.—This competition has been decided, Mr. Theophilus Allen, of John-street, Adelphi, having won the first place; Messrs. Drewe and Bower, of Margate, the second place; and Mr. Hooker, the third place.

NEW DOCK AT CARDIFF.—The Marquis of Bute opened the new basin at Cardiff on the 23rd inst. The following are the dimensions of the new basin:—Length 1,000ft.; width 600ft.; total area 12 acres. The entrance lock is 350ft. in length, and 80ft. in width. The junction lock is 370ft. long and 120ft. wide, sufficient to enable two large vessels to pass each other when coming in or out of the East Bute Dock. The height of water over the sill of the lock at spring tides is 35ft. 8½in., and at neap tides 25ft. 8½in. The walls, which are 50ft. high, are constructed of Pwllpant stone, being 25ft. thick at the bottom and 10ft. 6in. at the top. The wrought-iron gates at the entrance lock and the junction lock are well worthy of the attention of persons interested in great engineering works. That at the entrance lock is 80ft. wide, and was constructed by Sir William Armstrong and Company, of Newcastle-on-Tyne.



## UTILISATION OF TOWNS' REFUSE.

IN the sanitary department of the International Exhibition the Universal Charcoal and Sewage Company exhibit a case containing various specimens of charcoal which have been converted from the street sweepings of towns, &c., by their patented process. This process, which is in working at Salford, takes the promiscuous sweepings of roads, streets, &c., as it is found in a worthless condition, and converts it into a portable commodity at very profitable terms. The Company's contract with the Salford Corporation consists in the establishment of machinery, and paying a shilling a ton for a kind of refuse which is generally allowed to be of little or no worth, and manufacturing therefrom charcoal which is saleable at 20s. a ton. The objects the Company have in view are to "thoroughly disinfect and deodorise the worst kinds of town refuse," and the process in operation seems to have been successful. We are informed that the charcoal thus obtained is suitable for use in dry closets, in hospitals, public urinals, mouths of sewers, and for general deodorising purposes. Besides the above objects, the patent charcoal is being used to deodorise the nightsoil collected on the "pail system" at Salford. The process is further said not to injure any of the fertilising qualities of this valuable matter. Charcoal has hitherto been deemed too expensive for large use, though its absorbing qualities are well known. Liebig notices charcoal as a fertiliser. The carbon combines with oxygen; it absorbs the ammonia of decomposing animal substances, and stores up the gases for vegetation. As a mixture with liquid and other kinds of manure it is considered equally beneficial. Animal charcoal is neither so cheap nor plentiful as to admit of easy application, and it is therefore of some importance to know a cheaper kind of charcoal which will answer the purpose of deodorisation. Wood and peat ashes are known to possess the property of extracting ammoniacal and other salts; and, it is only reasonable to conclude, from these facts, that charcoal converted out of such matter as the refuse of streets, &c., cannot fail to be of great service: first, in deodorising elements dangerous in their raw condition, and, secondly, in profitably turning the compost into account; and even if it did the latter imperfectly, it would still be of great use by its first capability.

The case of specimens we have examined show twelve samples; the first gives us the raw street sweepings as collected by the authorities of Salford; the second division shows the rough charcoal as obtained by the carbonisation of these sweepings after coming from the cylindrical retorts of the apparatus, and in this condition it is converted into charcoal manure. In another department the rough charcoal is seen finally ground, suitable for general deodorising purposes, and for "dry closets," one-fourth only of the quantity of this being equal to dry earth as an absorbent. Analysis shows it has about twice the quantity of pure carbon found in animal charcoal. No. 4 compartment shows a still more finely ground charcoal, well adapted for moulders' purposes: it has a great quantity of pure silica. Another kind is fit for filtering purposes, and is made from the raw sweepings mixed with clay, free from sand, the whole being well incorporated, dried, and carbonised. The foulest sewage of Manchester, after passing through it, comes out a perfectly clear and tasteless effluent. Its porosity, we are told, will be regained after exposure to air. In the "charcoal manure" we have No. 2 mixed with the nightsoil; no putrescent effluvia is perceptible. The sample given contains about forty per cent. of soil. Another and stronger quality, called "Anti-Wireworm Manure," is given, and is destructive of all worms, grubs, &c. The "Artificial Animal Charcoal," for filtration, is obtained from a "useless refuse from one of the arts." It is mixed with clay and subjected to carbonisation, and is considered a first-rate filtering medium. It can be supplied of any size. "A sample of Manchester sewage, filtered through this charcoal, had fish living in it ever since August 12th, 1873, and they still continue healthy."

The "Birmingham street-sweepings charcoal," from macadamised streets, is nearly equal to that from Salford granite setts.

The following is the analysis of the charcoal manure exhibited:—

"Analysis of Salford street-sweepings, carbonised and mixed with excreta and urine—

	In 100 parts.
Moisture . . . . .	13.880
Organic matter . . . . .	26.340
Residue insoluble in acids . . . . .	46.810
Portion soluble . . . . .	12.970
	100.000
Phosphoric acid . . . . .	0.6150
Ammonia . . . . .	0.0133
Total nitrogen by combustion . . . . .	0.5600

"This manure contains a considerable amount of organic matter in the form of nightsoil, which must be highly beneficial to the ground. Also, every 100 tons contain nitrogen equivalent to 2.64 tons of sulphate of ammonia."

(Signed) J. CARTER BELL, F.C.S."

The mode of collection of the refuse, &c., is thus performed:—The "pail system" is used for the lowest class houses, the excreta and ashes being kept separate. For houses of better class the charcoal self-acting closet supplied by the Company is recommended, and these are under the inspection of town authorities. For middle and superior class of houses, a charcoal commode is most suitable. The cost of the processes, including sifting contents of scavenger's carts, as the broken pottery, metals, rags, &c., is less than 10s. per ton, and this provides collecting, preparation, and interest on money. The value per ton is, we hear, not less than 20s., thus leaving a clear 10s. per ton for cartage to land and profit. We understand about sixty tons per week of this refuse charcoal is being made at the Town's Yard, Salford. The apparatus there is simple. Two cast-iron cylinders are made to revolve, one above the other, the lower kept at a good red glow, the upper one heated by the waste heat from the lower. The street sweepings are introduced through a hopper into the upper one, where they are dried, thence passing into the lower retort they are thoroughly carbonised (not calcined), and then pass into a cooler for use. The noxious gases are consumed in the process by the fire. A pair of cylinders will produce about 60 tons of charcoal per week at about 6s. per ton.

## THE NEW GUILDHALL, PLYMOUTH.

IN our notice last week of this work, which is to be opened by a royal flourish of trumpets on the 14th of August, we mentioned the names of the local architects who have superintended the erection of the building, but we omitted to notice the most important fact of all, namely, that Mr. Edward W. Godwin, F.S.A., furnished the design, and that his name should have been given as joint or consulting architect. As it is notorious in London that Mr. Godwin was the chief actor in the business, it is amusing, to say the least of it, to see his name quietly and systematically ignored by the local authorities and papers. Possibly the Prince of Wales will supply the significant omission in his observations on the opening day.

## OLD AND NEW GLASGOW.

DR. JAMES B. RUSSELL, the Glasgow Medical Officer of Health, points out that the municipal authorities have, during the last eight years, really cleared away the worst portions of Old Glasgow, and built a new Glasgow under the Police Act of 1866, with the sanitary supervision therein provided. Old working Glasgow at present contains 87,333 persons, and its density of population is 387 persons to the acre. Four years ago it was 430; three years since, 423; two years since, 405. The authorities have thus taken 43 inhabitants, or 10 per cent., away from every acre of Old Glasgow, and left nine people where ten were. It consists of the Calton proper, Gorbals, St. Andrew's-square, Brownfield, High-street and closes east and west, Bridgegate and Wynds. New working Glasgow, on the other hand, in which the increase of population has been as remarkable as the decrease in Old Glasgow, consists of Woodside, Kingston, Hutcheson-square, Springburn, and Maryhill, Bellgrove and Dennistoun, St. Rollox, and Greenhead and London-road. It is the ring round the city—almost all of it touching the country on its outer border. The estimated population is 238,077, and the density 60 persons to an acre. Four years ago it was 49; three years since, 51; two years since, 56. The new density in comparison with Old Glasgow is, of course, a little deceptive, for there are great acres of unbuilt ground, such as on the Maryhill-road Glasgow Green, and the

Alexandra Park. But it is easy to see what a margin there is for making allowances, for the density is only *one-sixth* of that in Old Glasgow; and if even half the ground is unbuilt on, it is only *one-third*—that is to say, for every ten persons living on a built-over square of 10½ yards on each side of Old Glasgow in 1870, there are nine persons in 1874, and perhaps three persons in New Glasgow. The question arises how the health of the population has been affected. In the Old Town the birth-rate is 40; in the new it is a shade better, 41. On the other hand, the death-rate is enormously in favour of the New Town. It is 38 in the old, against 27½ in the new—two persons dying in the one for every three in the other, out of 1,000 persons living.

## COMMONS AND WASTE LAND.

THE following particulars will be found interesting:—A return recently laid before Parliament shows the area of England and Wales to be 37,157,173 acres, and the area subject to common rights is 2,632,772 acres, or about one-fourteenth part of the entire area of the country. This last quantity comprises 883,989 acres of commons apparently capable of cultivation; 1,486,476 acres of commons apparently mountainous or otherwise unsuitable for cultivation—but much of this is doubtless capable of improvement for pasture; and 264,307 acres of common field lands; these three items together constituting the 2,632,772 acres subject to common rights. These figures are much more nearly accurate than those of the Parliamentary return made in 1843, which has been generally accepted as the nearest approximation to the truth; but it is believed that the present return under-estimates the extent of common-land, for there is little doubt that a considerable extent of the lands set out in the title documents used in preparing the return as mountain, moor, sheep-walk, down, uncultivated, &c., may be subject to rights of common, although not so stated. The commons returned as apparently mountain or otherwise unsuitable for cultivation include 200,051 acres in the North Riding of Yorkshire, and 165,181 acres in the West Riding; 160,168 acres in the county of Cumberland; 144,604 acres in Westmoreland; 121,288 acres in Brecon; 85,958 acres in Montgomery; 82,550 acres in Merioneth; 79,835 acres in Devon. The figures in the return of 1843 were the more readily accepted on account of the great extent of waste land known to exist in the higher parts of the country—an area subsequently shown by the agricultural returns to approach 10,000,000 acres. The term "waste land" is frequently used as synonymous with common, and the two are apt to be erroneously reckoned as the same.

## CHIPS.

During the past few weeks the scaffolding erected in the south transept of York Minster has been removed. The whole has been deposited in the School of Art yard for sale. All is expected to be ready for a grand opening early in November. The exterior restoration of the south front is being pursued slowly.

An election to an almshouse and pension of the Tilers and Bricklayers' Company will be held on Monday, August 10th, at the Albion.

The foundation-stone of new Church schools, at Longborough, Gloucestershire, was laid on Monday week. The building will cost £500. Messrs. Newman and Sons, of Evenlode, are the builders.

The memorial-stone of a new Baptist school, at Liss, Hants, was laid on Thursday week. Mr. T. Wonnacott, of Farnham, is the architect.

The bell-turret of the ancient but recently restored parish-church of Thornton-le-Moor, near Caistor, was struck by lightning on Wednesday week. The cross on its summit was broken and overturned. The turret, which is an interesting specimen of Early English work, was cracked, and several stones displaced.

The Tabernacle Chapel at Haverfordwest was reopened on Thursday week, after restoration and enlargement. Messrs. Lawrence and Goodman, of Newport, Mon., are the architects, and Messrs. Allen, of Pembroke Dock, the builders.

A new Wesleyan chapel is about to be erected at Caerswa. Mr. Edward Jones, of Newtown, Montgomeryshire, is the architect.

It is stated that the Government will not proceed this year with the new Mint Site Bill, but will reintroduce the measure next year.

The City of London Commissioners of Sewers have increased the salary of their Engineer and Surveyor, Mr. William Haywood, M.Inst.C.E., from £1,500 to £2,000 a year.



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FITZ-ALAN CHAPEL, ARUNDEL — PARISH CHURCH, ARUNDEL — MAIRIE DE L'ISLE D'ADAM (SEINE-ET-OISE) — 74, CORNHILL — GREENHURST, NEAR OCKLEY, SURREY.

## OUR LITHOGRAPHIC ILLUSTRATIONS.

## FITZ-ALAN CHAPEL, ARUNDEL.

THIS illustration gives a view of the sanctuary of the Collegiate Chapel at Arundel, founded by Richard Fitz-Alan, Earl of Arundel, A.D. 1380, and is usually called after his name; it has since served as a mortuary chapel for the succeeding earls and other members of the family, and is situated at the east-end of the parochial church, occupying the position of the chancel, and might easily be mistaken for it, but the tower or chancel arch, being fitted with an iron grill, boarded on one side, entirely cuts it off from the body of the church, and deprives the latter of the grand vista it must originally have had. On the north side of the chapel is a smaller one dedicated to the Blessed Virgin, and another at the rear of the high altar dedicated probably to the patron saint; the original altar in each case still exists, and except the slabs, which are of Sussex marble, nothing approaching decoration remains upon them; even the reredos to the principal altar, as may be seen in the view, is no more than a plastered wall, and as it doubtless had some embellishment to harmonise with the adjoining monuments, triptych and tapestry—which Waller's army, while quartered in this chapel probably removed, as they did the painted glass from the large east window—may have done the work. At present the building is little more than a ruin, though apparently more cared for than in the year 1702, as may be seen by the following paragraph, written at that date:—"The chancells of Arundell lye very indecently. It rains into the great chancel, and the roof thereof is, some of it, fallen down, and the rest will quickly follow, if not repaired and kept dry. 'Tis a thousand pities, being the finest thing one of them, in that kind, I ever saw." At length some one, undoubtedly interested in the lead which covered the roof, reported to the proper authorities the dangerous condition of the whole of its woodwork and groined ceiling, and, notwithstanding the report being a false one, succeeded in obtaining orders to remove it, which required nothing short of violence to carry out. Mallet, crowbar, and saw were put to work, and the whole of the massive timbers, as they were torn from the walls, were suffered to fall at random into the body of the chapel, carrying destruction to everything below. Monuments, effigies, metal-work, stalls, all shared in the general wreck, the effect of which, to the present day, is only too visible. The building, nevertheless, contains many objects of interest, including several brasses, &c. The monuments shown in view are those of Thomas Fitz-Alan, son of the founder, and his countess, situated in the middle of the sanctuary and executed in alabaster; and that in the openings between the chapels is a cenotaph to John Fitz-Alan, who died in the year 1435 at Beauvais, and was buried there. The very elaborate monument or chantry on the south side of the chapel is that of William Fitz-Alan and countess, executed in Purbeck marble; it is extremely rich in ornament, but in a very debased style. The quaint and curious one on the north side of the altar is that of the Earls Thomas and William, and although much invaded with foreign details, it is most suggestive. The painting from which this drawing is copied is by the same artist, and is now on exhibition at the Royal Academy of Arts, entitled "Requiescant in Pace."

## PARISH CHURCH, ARUNDEL.

This edifice, dedicated to St. Nicholas, is built upon the site previously occupied by the Old Norman Church, at the east-end of which was

added the collegiate chapel or Fitz-Alan Chantry, which fulfilled the purposes of a chancel. The old church suffered so much from neglect during the French wars in the reign of Edward III., that for a long period afterwards it assumed an aspect nothing short of a ruin. Late, however, in the season for Gothic art, the monks struggled to rebuild it, and replaced it with the present edifice of which even builders of an earlier date might not have been ashamed. Uniting, after the manner of its predecessor, with the Fitz-Alan Chantry its length is very imposing, and its beauty greatly increased by a well-proportioned central tower, crowned with a pyramidal roof. The latter, according to tradition, was erected for the purposes of serving as a landmark for sailors, it being so prominently situated; but the circumstance looks doubtful; besides, such an apology for its presence is most unnecessary, as it really makes, with its bold and simple finial, a finish that groups most charmingly with the remainder of the building. There are three entrances to the church, one under the west window, another at the north aisle, which has an ancient timber porch, and the third opening to the south aisle, whose porch is entirely constructed of stone, including the roof. The interior offers little or no attraction whatever; the altar being placed in the north transept, the baptistery in the south, the organ-gallery under the tower arch, together with the cumbersome looking pews, make it the most unsightly interior ever witnessed. I understand that Sir Gilbert Scott is to be entrusted with its restoration, so we may hope to see considerable improvement. The description of the Fitz-Alan Chantry and Lady Chapel, together with an illustration of the interior, will appear in the course of a few weeks.

H. A. G.

## MAIRIE DE L'ISLE D'ADAM (SEINE-ET-OISE).

We give front and end elevations and section of the Mairie de l'Isle d'Adam, built from designs by Messrs. Roguet, Boileau, and Son, architects, at a cost of 57,000 francs. The building is constructed of local stone. The arrangement of the interior is shown by the illustrations.

## 74, CORNHILL.

This illustration represents a new building lately erected in Cornhill for Mr. A. J. Nash, a large glass and china merchant. The house is divided into basement, shop, and mezzanine floor, used by the proprietor; the other floors are divided into suites of offices. In order to gain height, the mezzanine, and the floor over, are but 3in. thick, constructed with  $\frac{3}{4}$ in. wainscot flooring boards, screwed to  $1\frac{1}{4}$ in. rough deal boards (laid crosswise), between which is a layer of hair felt. The rough boards, 3ft. 6in. long, take their bearing on the flanges of J iron  $1\frac{1}{4}$ in. deep; the ceiling (Jackson's patent) is screwed up to the under side. The exterior is faced with Allan's red bricks, red Mansfield, and Portland stone strings and cornices. The work, with the exception of the shop-fittings, which were made by Messrs. Drew, was executed by Messrs. King and Son, builders, for the sum of £3,500, from the designs of Mr. Thos. T. Smith, Architect, Bloomsbury-square.

## GREENHURST, NEAR OCKLEY, SURREY.

This house is situated about a mile from the Ockley Station, on the London, Brighton, and South Coast Railway, and standing on a gentle slope with a south-west aspect, it commands an extensive view of Leith-hill. The total length of the main building is 107'6ft. and the depth 56ft. The walls are built of red brick, with Douling stone dressings, and the roofs are covered with Staffordshire tiles. The porch, by which the

house is entered is on the east side, and opens into the hall, 31ft. by 18ft.; from the hall direct access is given to the library on the left, 27ft. by 19ft.; to the drawing-room, *en suite*, 29ft. 6in. by 19ft.; and to the dining-room, on the right, 30ft. by 18ft. Access to the billiard-room, 19ft. by 24ft., is obtained from the main staircase. The study has a separate entrance from the garden, besides that from the house, and is provided with lavatory, &c. The principal staircase is placed between the study and billiard-room. Ample office accommodation is provided, including servants' hall, 22ft. by 15ft.; housekeeper, 15ft. by 14ft.; butler's pantry, with safe and sleeping-room, adjoining kitchen, 20ft. by 20ft.; cook's pantry, larders, &c., being arranged to the north. The cost of the house has been about £11,000, and of the stables £2,000. The works have been carried out by Mr. Shearburn, of Dorking, from the designs of Mr. Jas. P. St. Aubyn, of Lambeth-building, Temple, London.

## TRIAL OF FIRE-ENGINES AT THE CRYSTAL PALACE.

ON Monday there was a competition among fire brigades at the Crystal Palace. Nine-teen companies entered, and brought with them engines from Ashford, Barnet, Brixton, Bromley, Canterbury, Carshalton, Croydon, Eastbourne, Epsom, Hastings, Leyton, London, Oxford, South Norwood, Streatham, West Kent, Wimbledon, Woodford, and Wood-green. Altogether there were, including the steam fire-engines sent by Mr. Merryweather and Messrs. Shand and Mason, some thirty engines on the ground. The contest was divided into three competitions. The first was as to which should first get the water into play upon an imaginary fire. In this competition the Bromley engine got to work in as short a space as 53 seconds; the Croydon engine was second with 59, and Oxford third. The second competition was for running-out hose drill, and in this the Croydon firemen, with Merryweather's engine, won. In the third competition Oxford won with a Merryweather engine. This was a competition in which the hose of 40ft. length was to be run out, ladders fixed and connected and raised against a wall, the first man reaching the top being the winner. In this contest Oxford was first, Bromley second, and West Kent third. The Bromley engine, however, was only beaten by one second. After this there was an exhibition of Mr. Bayley's new fire-escape in the Palace. Instead of the canvas screen which prevents the old machine being moved against the wind, and which always takes fire in case of a severe conflagration, the shoot is made of fine copper wire which, while it keeps out the flame, remains almost unaffected by its action; it is, in fact, the principle of the Davy lamp applied to a fire-escape. It has also a folding ladder, which is raised by a simple application of levers, and will reach nearly 90ft. Another experiment was tried at nearly 90ft. from the floor, by which people could lower themselves from a window in case of a house being on fire.

## CHIPS.

A cast of the upper part of a supposed statue of Sappho, from Cyprus, has been presented to the British Museum by Professor Anton Bachmaier.

The foundation-stone of the new church of St. Mary, Newington, was laid on Wednesday. The building, which will hold 1,300 people, is being erected by Messrs. Downs and Co., from designs by Mr. James Fowler, of Louth. It will be 180ft. long, 96 wide outside; and the spire will be 190ft. high.

On Tuesday the foundation-stone of a new Welsh Independent Chapel and School was laid at Hanley. The chapel is to accommodate 300 and the school 200, at a cost of £1,650. Mr. W. Sugden, of Leek, is the architect, and Messrs. Redfern, of Hanley, the builders.







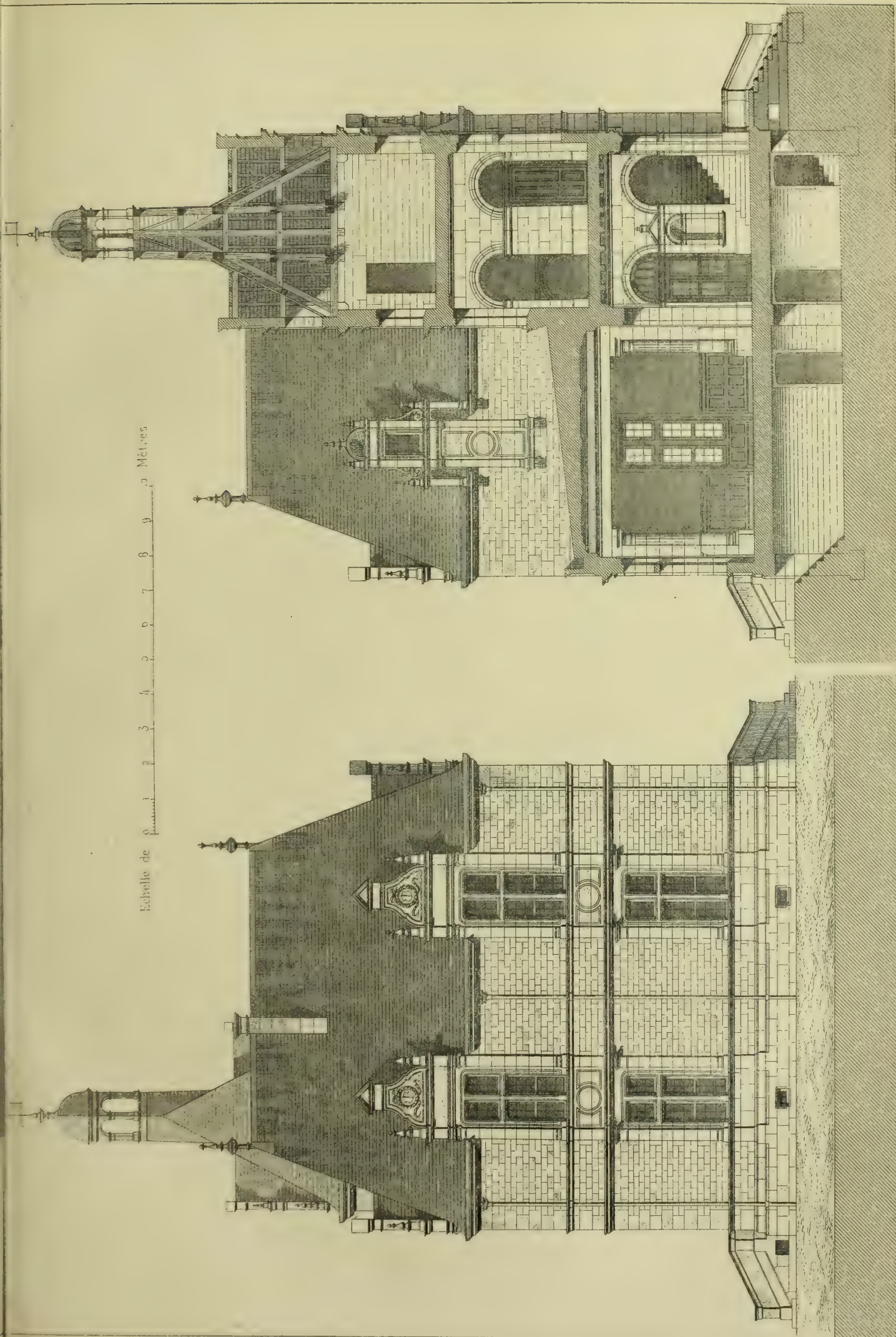
MAIRIE DE L'ISLE-ADAM

SEINE-ET-OISE

VOQUET ET BOILEAU FILS, ARCHT'S.







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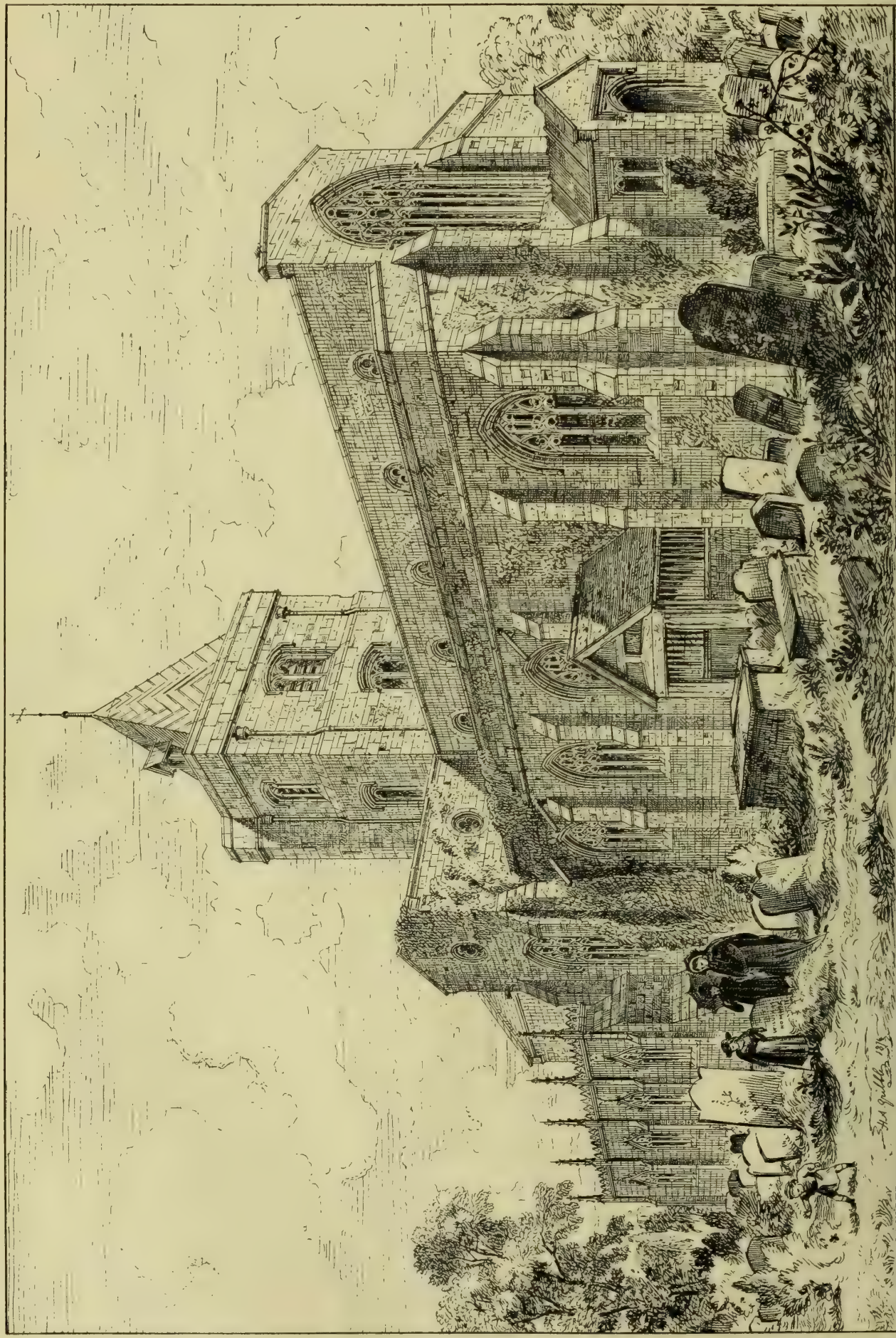










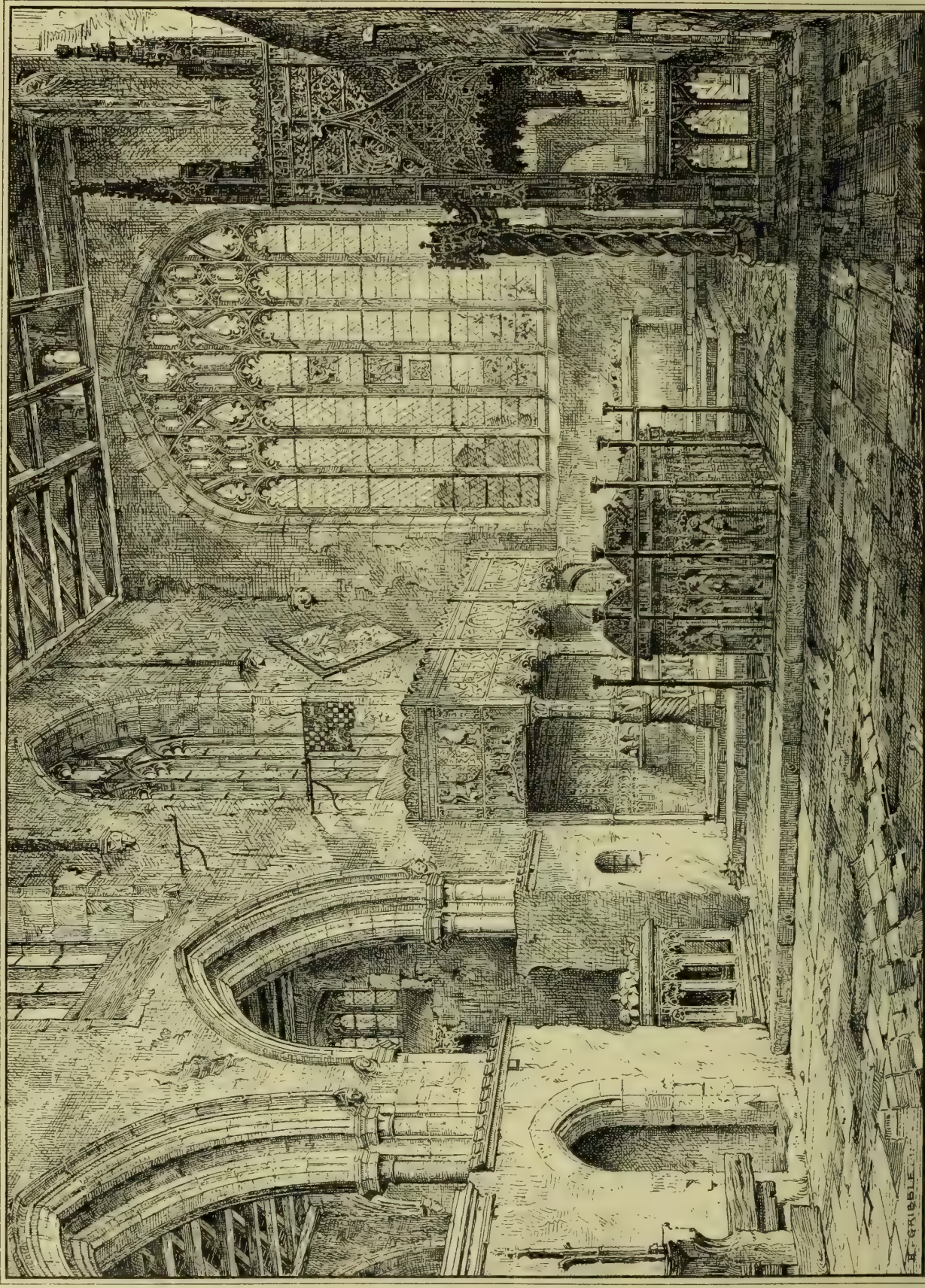


THE PARISH CHURCH, ARUNDEL.









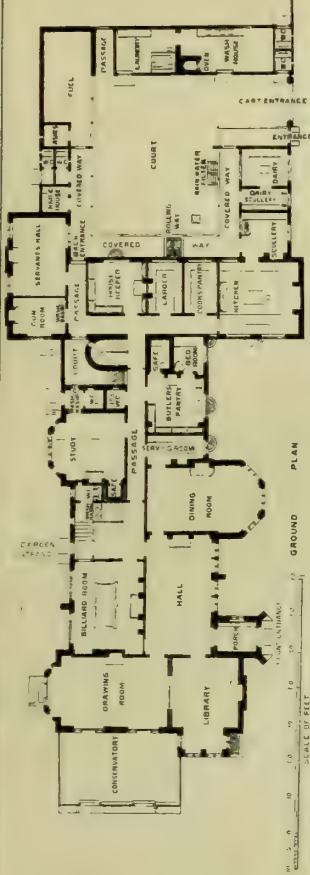
SECTIONAL VIEW OF INTERIOR OF THE FITZ-ALAN SANCTUARY. ARUNDEL.

From the original drawing in possession of His Grace the Duke of Arundel & S. H.

Photo. Daguerres. & signed by James Alcock, St. George's Lane, W.C.



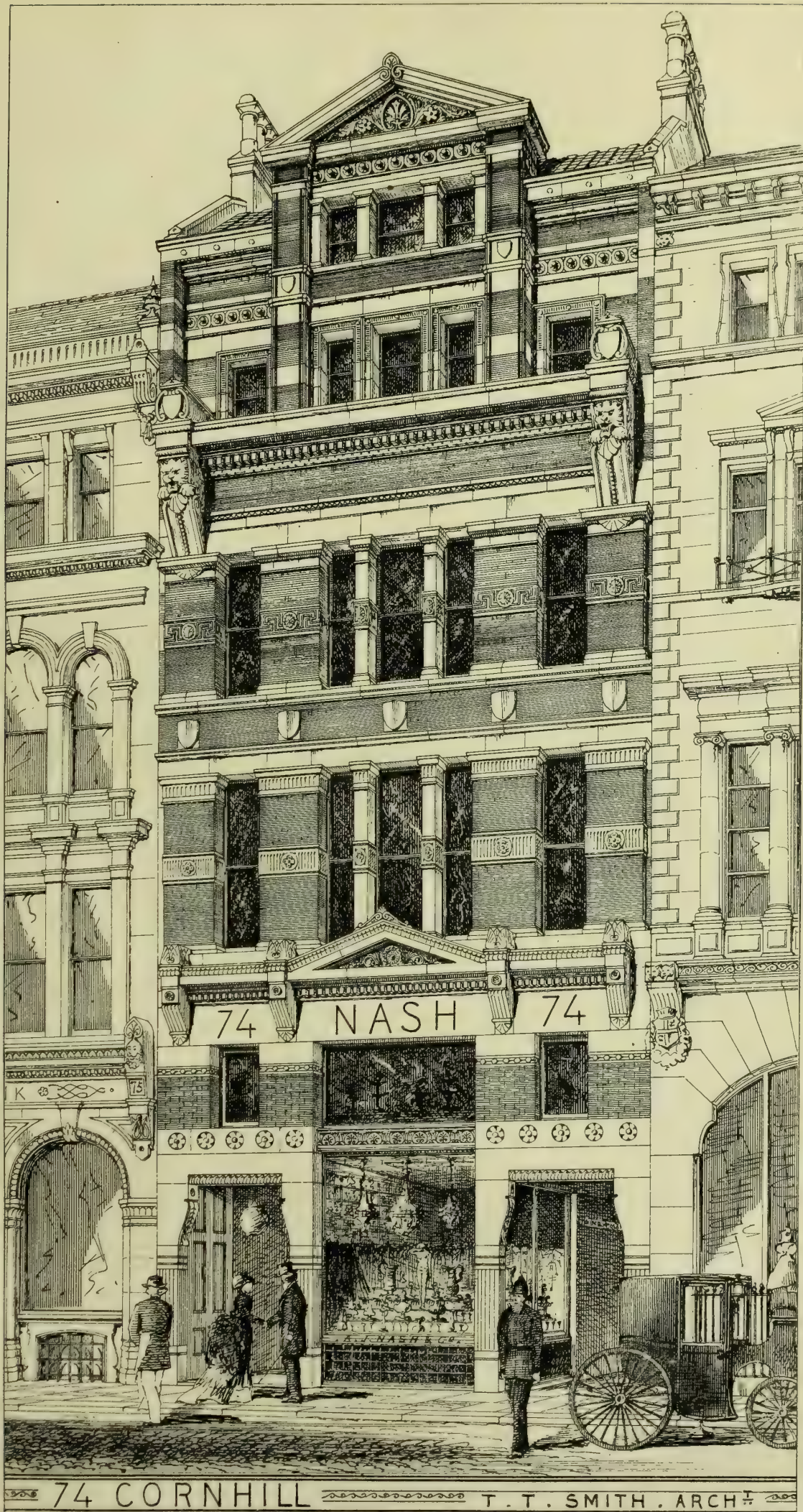
GREENHURST OCKLEY SURREY  
THE RESIDENCE OF THOS. LAMBERT ESQ  
J. P. ST AUBYN, ARCHITECT.

















ROYAL ARCHÆOLOGICAL INSTITUTE.  
RIPON MEETING, 1874.

IN our report last week we gave a brief summary of Mr. Edmund Sharpe's paper, read on Wednesday, on the "Monastic Buildings of the Cistercian Order." Of this paper we now give a more extended report. We hope shortly to publish, with Mr. Sharpe's permission, two illustrations of Fountains Abbey, from his book on "The Architecture of the Cistercians," the first part of which has just been published.

Mr. SHARPE said: It is more than forty years ago, when travelling abroad in 1832, as one of the Travelling Bachelors of Arts of the University of Cambridge, that I was first struck with certain peculiarities which I observed in the remains of the monasteries of the Cistercian order of monks, which led me to believe that they must have followed certain rules of their own as well in the plan of their conventual buildings as in the design of their churches. Further observation confirmed these impressions. I became interested in the matter, and so arranged my journeys as to enable me, during the three years that I was absent, to visit nearly the whole of the principal Cistercian abbeys in France and Germany. I have subsequently had opportunities of examining several in France that I did not previously visit, and the remains of nearly the whole of the English monasteries of that order, six of the abbey-churches of which are illustrated in the work which I published in 1846, entitled "Architectural Parallels." The conclusion to which this study of the works of the Cistercians brought me, led me to examine, somewhat carefully, the chronicles which give the earliest accounts of the rules and history of the order; and I found, as I expected, sufficient reason for concluding and asserting that the Cistercians followed certain rules of their own in regard to their buildings, which distinguish them, for at least the first 200 years of the existence of the order, from those of all other religious bodies of that time. The three principal monastic orders of the Middle Ages were:—I. The Benedictine; II. The Præmonstratensian; and III. The Cistercian. Of these three orders the Cistercian, which was an offshoot from the Benedictine, was the latest. The order arose in the west of France at the close of the eleventh century, and was instituted by three monks of the abbey of Molesme, in Burgundy, who, retiring to a desert and secluded spot in the diocese of Chalons, established there in 1098, the convent of Cîteaux, where they lived after a new and stricter rule, founded upon that of the order of St. Benedict. Great, however, as became in a short time the reputation for sanctity of these early founders of the order, and favoured as were their efforts, not only in the establishment of Cîteaux, but also of several dependent abbeys, it is to the great St. Bernard that the extensive renown and rapid increase of this order is to be attributed. He appears to have entered the abbey of Cîteaux in 1112, and to have been sent with twelve monks to occupy the new abbey of Clairvaux as its abbot in the year 1119. During his lifetime a very large number of Cistercian monasteries were founded. The order continued to be exceedingly popular and prosperous until the end of the thirteenth century, when the same laxity which had corrupted the other orders began also to affect the Cistercians, and we find them ultimately departing from the precepts of their founders, not only in regard to external forms, but also in their discipline—a departure as apparent in the style of their buildings as in their mode of life. A considerable number of the abbey churches of this order remain at the present day, and although subsequent extension and alterations have in many cases swept away the original structures, still a large portion of those that are left are the early buildings of the twelfth and thirteenth centuries, and belong to the period when the whole of the rules of the order were fully enforced. In France they are the most abundant, in Germany many valuable examples still exist, and in England they are to be reckoned amongst the most interesting of our monastic remains. I need hardly add, that in all three countries they are chiefly in a state of ruin, except where they have been devoted, as occurs in some few cases, to some secular purpose. I have already spoken of the number of the abbeys of this order, but it was not until the year 1128, that is to say, thirty years after the foundation of Cîteaux, that they began to increase with any degree of rapidity. Within 200 years of that date, no less than 1200 abbeys were founded, erected, endowed, and added to the order; and

the entire number of dependencies possessed by the abbot of Cîteaux shortly before the Reformation is stated to have been 3200. Now of those 1200 monasteries I do not know one the general plan of which is not in accordance with that of all the rest; nor a single church which does not bear in its details the impress of its Cistercian origin. The buildings of the Cistercians were always laid out according to one normal plan. Whether the abbey was of the largest or of the smallest type, this model was rarely, if ever, departed from. Variations occur in the comparative size and ornamentation of the different buildings of an abbey, but never in their disposition. This uniformity of procedure has enabled me to show upon a typical plan—a true representation of the whole of the normal buildings that surround the cloister quadrangle of a Cistercian monastery of the twelfth century. This model plan is the concrete result of the aggregate plans of the whole of the Cistercian abbeys that I know.

Of the general buildings the church was, of course, the most important. The rules in regard to it were formal and numerous; amongst others the following are the most remarkable. They were all dedicated to the Blessed Virgin. They were also all built after the form of the cross. The choir was invariably short, seldom containing more than two compartments in length beyond the crossing. The east end was usually square, and not terminating with an apse, showing a marked departure from the manner in which churches of this date on the Continent were usually finished towards the east. Towards the close of the twelfth century, however, the prevailing fashion of the times was introduced also into some of the churches of this order, and the apse, with its accompanying chapels, applied to the east end. Whether the church of Clairvaux Abbey, which was rebuilt on a grand scale by St. Bernard himself in the middle of the twelfth century, was originally thus finished or not appears to be uncertain, for the building has been subsequently much changed and modernised, and being used at present as a gaol is difficult of access; I am unable, therefore, to say whether the plan which I have of it represents its original condition or not; if it does, it was in all probability the first of these churches built with an eastern apse and radiating chapels. Brombach and Altenberg are the only German exceptions to the rule that I know of, and Croxden and Beaulieu the only English ones. Fontfroide has, singularly, a polygonal apse to its choir, and one to each of its transeptal chapels; and Pontigny has an apse planned very like that of Clairvaux. The transepts had no aisles, but invariably two or three chapels on their east sides, completely separated from one another by partition walls in the earlier examples. Each of these chapels had its altar and its piscina. In most of the ruined abbeys of this order the sites of these altars are apparent; and at Jervaulx Abbey, in Yorkshire, two of the altar stones remain *in situ*; and the site of six of the nine altars that existed in the eastern transept of Fountains Abbey have just been discovered and laid bare by Lord Ripon. In many of the Cistercian churches we find a portico or narthex extending across the whole of the west end of the church. It had no great width, and was generally roofed as a lean-to against the west wall, and covered the west doorway, as at Fountains and Byland; but in some it was vaulted, as at Maulbronn and Pontigny. Its use is not very obvious. We find no lofty towers in Cistercian churches, except such as were built after the rules of the order became relaxed, as at Fountains and Furness, where towers were added in both cases towards the close of the Rectilinear period. They were, in fact, expressly forbidden in the General Chapter of 1135. And again with regard to bells we find:—"Cap. XII.—*De Campanis*.—Campanæ ordinis nostri ita fiant ut unus tantum pulset eas, et nunquam duo simul. Notandum autem quod cum sit intervalum inter laudes et Primam, modice debet pulsari major campana." These wooden bell-turrets existed in most of the early French abbey churches of this order, over the crossing. There is a representation of such a turret so situated in an early engraving of the church at Cîteaux before it was destroyed; and there is one existing at Brombach, with a small circular opening beneath it, in the apex of the western arch of the crossing, through which the rope descended to the floor of the nave. In England the four walls of the crossing were in many cases carried up above the roofs of the four arms of the cross, and covered with a low pyramidal roof. At Kirkstall this low

central lantern still exists. They prohibited all carved works of a superfluous or highly decorative character in their buildings, and all pictures, except those of our Saviour; and directed that diligent inquiry should be made into these matters at the periodical visits of the abbots, so as to ensure the observance of the rule. They prohibited stained glass, except in such abbey churches as had belonged to other orders, and in which it existed previously to their conversion. They permitted only royal personages and bishops to be buried in their churches. Their abbots were interred in their chapter houses, and the common monks in the cloister quadrangle. The conventual buildings of a Cistercian abbey were usually placed on the south side of the church, which was generally the first building constructed, and against the wall of the south aisle of which the north walk of the cloister was commonly built. There were, however, occasional exceptions to this rule, caused often by peculiarities of site, of which Tintern, in England, and Fontfroide in France, are instances, in both of which the conventual buildings are placed on the north side of the church. I know of no monastic remains of this order in England, in which the cloister, or any part of it, is left. At Fontenay in France—the counterpart of Fountains in England—there is a magnificent cloister of early Transitional character, in perfect preservation. Vallemagne and Fontfroide retain also their cloisters, but of later date. At Brombach in Germany, the cloisters still remain, but in that country, as in England, they have almost completely disappeared. The access from the church to the cloister was by a doorway facing the east walk of the cloister, in the wall of the south aisle where it joins the south transept. This doorway remains in almost all the Cistercian churches that are left in the three countries.

Close adjoining the church, on the south side of the south transept, was the sacristy. The access to it was usually by a doorway in the south wall of this transept, and by no other. It was lighted by a window in the east wall, and was invariably vaulted. Sometimes it was approached from the cloister, and not from the church, and had a doorway in its west wall; in which case it occupied the whole of the narrow space between the transept and the chapter house, as in Jervaulx Abbey. More frequently, however, we find this space divided into two portions transversely, separated by a partition wall, the eastern portion being the sacristy, and the western a cell, the use of which cannot be pronounced with any degree of certainty.

It has been suggested that the cell just mentioned was used as a sort of morgue or dead-house, in which the bodies of the monks were deposited during the interval which elapsed between their death and their burial. It appears to me from various circumstances, however, to be much more likely that it was used as a place of confinement for monks condemned in the adjoining chapter-house for some of the numerous small offences which rendered them liable to this punishment. The doorway which opened to it from the cloister was usually quite plain, and was rebated and prepared for a door that was capable of being securely fastened, which was not the case with many of the other openings. This cell was, like the sacristy, usually vaulted, but quite plainly; it had no window. Reference is sometimes made in early chronicles to a place of confinement called the Lantern; the offender is said to be placed "in Lanternā." Was this cell the penitentiary of the convent, and was it called the lantern in jest; "Lucus à non lucendo?" In some cases the partition between the sacristy and this cell has, at a later time, been removed, as if the use for the latter no longer existed; and in some the vaults run through, and the partition appears to have been constructed subsequently. In other cases again, both the sacristy and the cell occur side by side, between the transept and the chapter-house. In Furness Abbey there are two such cells, one on each side of the vestibule of the chapter-house.

We next come to the chapter-house, the building which ranked next to the church in importance, and the architecture of which was always of a superior character to that of the other conventual buildings. Its axis lay uniformly like that of the church, east and west. It was usually divided transversely into three equal portions by circular or clustered piers, and was invariably vaulted with well-moulded vaulting ribs, springing from elegant clustered piers and moulded capitals. It was approached from the cloister by



a large archway, having on each side of it similar arched openings resembling windows, but which sometimes came also down to the ground, but usually were finished like windows with a cill about 3ft. above the floor. None of these openings were closed; the doorway, if it may be so called, was not prepared for a door, nor the windows for glass or casements. The chapter house was therefore open to the outer air, for the cloister itself was so—a circumstance which is quite in consonance with what we know of the hardy habits of these Cistercian monks. This triple arcade, of which the side arches had usually double arches, is one of the most striking features in the cloisters of a Cistercian convent. We have excellent examples at Kirkstall, Fountains, Buildwas, Calder, Croxden, Jervaulx, and Netley, in England; in Fontenay, Vallemagne, and Fontfroide, in France; and in Maulbronn, Brombach, and Altenberg, in Germany. The chapter house was lighted chiefly by the east windows, one at the end of each of its three aisles; but also by north and south windows in such of its compartments as projected beyond the adjoining buildings. The abbot's seat was in the centre of the east wall, and the monks were ranged round the building on one or more rising stone seats along the north and south walls; these stone seats are still left in the chapter houses of Fountains and Jervaulx; and might be discovered, no doubt, in many others, if searched for. The abbots were buried in the chapter house, and their tombstones, level with the floor, have been discovered in most Cistercian abbeys; a considerable number was found at Furness, and are still preserved in the abbey grounds. In one Cistercian abbey only with which I am acquainted, is the form of the chapter house other than that of a parallelogram; at Margam, in South Wales, the chapter house is octagonal.

We have next a narrow apartment, which, as it appears in many cases to have had a door at each end, has been supposed to be the locutorium or parlour, in which the monks were allowed by special permission of the superior to converse with relatives or friends. Knowing the stringency of Cistercian rules, which enjoined almost perpetual silence, and being doubtful whether, in many cases, the access to the outer of these two doorways would be a convenient one for strangers, I have a difficulty in accepting this designation; but having no better to offer, will allow it to stand, until further light be thrown on the subject—it was invariably vaulted, and generally quite plain.

Adjoining the latter apartment, where it exists, we have invariably a passage leading direct from the cloisters into the precincts on the east side of the buildings. Where the abbot's lodge was on this side, as appears to have been frequently the case, this was, no doubt, his means of approach to the centre of the convent, the chapter house, the refectory, and the church. It is always vaulted, and usually treated in a superior manner. Interesting examples occur at Fountains, Jervaulx, Croxden, Fontenay, and Brombach. In some cases only one of these two apartments—the passage, namely—exists; and in others both have the appearance of passages, although their distinctive designation in this case appears difficult to assign. In others, again, their relative position is changed, the passages being next the chapter house, and the apartment next the frater, as at Kirkstall. It must be said, however, that these two apartments seldom remain, at present, in their original condition; an eastern doorway in some having been converted into a window, and occasionally a window into a doorway.

The last building to which access was obtained from the east walk of the cloisters was the frater, the ordinary day-room of the monks, which, with its axis lying invariably north and south, extended considerably to the south, beyond the adjoining buildings, and was therefore well-lighted. Unlike the chapter-house, it had a single row of piers only (usually circular or octagonal columns) carrying plain quadripartite vaulting, without groin ribs; indeed, the whole apartment was treated in the plainest manner possible, in strong contrast with the chapter-house and refectory. Not only was this living-room of the monks unfurnished with a fireplace, but what is more extraordinary, we find, in two examples at least, indications which prove clearly that the extreme south end of this building was not closed. At Furness the two southernmost compartments of the frater—one of the longest and finest in Europe—have arched openings in their north and south walls in place of windows. These openings descend to the ground, and were evidently originally not

closed; similar openings, similarly finished, occur also at the extreme south end of the building; so that this end of the building must have been open to the outer air during all seasons, night and day, a circumstance which gives us an idea of the austerity of the life that these hardy monks lived in the twelfth century.

Next to the frater, and on its west side, we usually find the stairs which led to the monks' dormitory, which was over it, and which we shall notice presently. Under these stairs occur sometimes stone lockers and closets, which may have been used as cellars.

The first building entered from the south walk was the kitchen, which usually had two large fireplaces in its east and west walls, and sometimes more; at Jervaulx, where it is later, and otherwise placed, there are four, occupying each one of the four sides of the building; at Fountains there are two of prodigious size, the horizontal arches of which are formed of joggled stones 4ft. 6in. in length. Excellent and early examples of Cistercian kitchens exist at Fontenay, Brombach, and Rievaulx Abbey, which preserve still their deep and wide fireplaces, their funnel-shaped chimney, and their circular stone chimney-shafts at the top.

In the centre of the south walk, and with its axis running north and south, was the refectory. It was the building which, after the chapter-house, had the greatest pretension, and was finished with the greatest attention to its architectural details. In the other orders we find the refectory usually placed alongside the south walk of the cloister, with its axis running east and west; in the Cistercian convents it is placed, on the contrary, as already described, always north and south. It is generally a very elegant building, with a single row of columns down the centre, supporting a wooden roof, and rarely vaulted. It had almost invariably an arched recess or gallery on its west side, reached by a flight of stairs in the thickness of the wall, the approach to which from the refectory was by a doorway in the wall itself; in the front of this gallery, facing the east, was a pulpit or stone desk, from which one of the monks read portions of the Scriptures during the hour of refection.

Close adjoining the refectory, either in the south wall of the south walk, or in a small separate building opposite the refectory doorway, was the lavatory; we find it in the latter situation at Fontenay and Thoronet in France, at Maulbronn in Germany, and at Vervela in Spain. At Fontenay this building, which is now destroyed, was square, and formed part of the original design; at Maulbronn it was octagonal, and at Thoronet and Vervela it was hexagonal; but in all the latter cases it belongs to the fourteenth century. But the more usual situation of the lavatory was in the south wall of the cloister; at Rievaulx Abbey it extended along this wall on both sides of the refectory doorway, and was covered by a handsome circular arcade; the channel for the overflow and the drain from it remaining still. At Croxden and Furness Abbeys, though the refectory itself has in both cases disappeared, ornamental remnants of the lavatory still exist, as well, in the latter case, as the drain which carried off the water.

Between the refectory and the next chief building that we have to describe are usually found one or two apartments, the exact nature or use of which it is not always easy to determine. That at Fountains it was here that the stores and provisions were kept appears to be certain, for in the doorway or opening that existed between the refectory and this apartment we find clear traces of the place where the turntable worked, on which the daily rations were placed, and served to each monk in succession as they entered the refectory.

The last and most important building of the conventual group that we have to examine is that which occupies the whole of the west side of the cloister quadrangle, and usually projected far beyond it. It is the building which I have concluded was the domus conversorum of the monastery, comprising the day-room and dormitory of the conversi, those members of the convent who, as the servants of the monks, performed all the daily labour of the monastery. This was generally the longest building in the monastery, measuring, in some cases, 300ft. in length. It was planned like the other two secular buildings already noticed—the frater and the refectory—with a single row of columns, usually circular or octagonal, throughout its entire length, carrying simple quadripartite vaulting, the perspective effect of which, in the long vistas of Fountains, Brombach, Vaclair, and others, is particularly striking.

It is usually a low building, the piers not often exceeding 4 or 5ft. in height. This building at Fountains, which is vulgarly supposed to be the cloisters, is a remarkable example, and is one of the longest that I know. At Furness an almost equally interesting one has been recently discovered. In some few examples this building appears to have been originally divided by partition walls into two parts, and it seldom happens, where it was originally undivided, that it remained so up to the dissolution of the monasteries. These subsequent divisions, therefore, must be distinguished from those which formed part of the original design, and which, as I have already said, are very rare. At Maulbronn, however, the domus conversorum was thus divided, one of its portions receiving a much more ornamental treatment than the other. In some cases we find a small building attached to the domus conversorum on its west side, which was probably the residence of the master of the conversi. At Fountains it consists of a small room, having a fireplace in it, and a covered porch for approach, with a flight of stone stairs at its side, passing over it to the upper story of the building. An entrance to the church was always provided from the day-room of the conversi, either by a doorway direct from the latter to the south aisle of the church, or by one at the west end of the south aisle. The day-room was lighted throughout its entire length by windows on its west side, one in each compartment—as well as in its south or end wall, and partially also in its east wall; nor can we fail to observe how admirably the general disposition of the buildings in this early plan of the Cistercians is adapted to the admission of light and ventilation to the three principal buildings of the convent, the domus conversorum, the refectory, and the frater. The conversi's dormitory was usually a long undivided chamber over the day-room, to which access was obtained either by a newel staircase in one of its walls, or by a staircase planned like that I have already described as situated between the frater and the kitchen. It had a range of windows on each side corresponding with those below, and was usually covered with a wooden roof; but at Vaclair, in France, the day-room and dormitory correspond in every respect, both being elegantly vaulted, and having each a row of columns with floriated capitals throughout their entire length, and double circular-headed windows in each compartment; the whole forming a noble range of building, with high-pitched gables at each end, and fine wooden roof above the upper vaulting. Access to the church was occasionally provided also for this dormitory by a flight of stairs at its north end. Over the monks' day-room, or frater, there was a dormitory for their use, corresponding in every respect.

From the monks' dormitory it was absolutely necessary that there should be ready access to the church, their rules obliging them to enter it during the night-time. This was obtained by covering the whole of the vaulted buildings that intervened between the frater and the south transept of the church with a second story, the floor of which was on the same level as that of the dormitory, and by adding a flight of stairs in the south transept of the church, against its west wall. In some of the earlier buildings we find a newel staircase to have been first constructed in the middle of the south wall of the south transept, as at Fountains; but this mode of access seems almost uniformly to have been subsequently abandoned for the more convenient and straighter access afterwards introduced. There is scarcely a single Cistercian church which does not contain this staircase, or traces of its existence. But the second story of the chapter-house was appropriated to another and very important purpose; it was used as the scriptorium or library, where the books were kept, and the MSS. written and illuminated. I do not know a single instance where this chamber is preserved entire. In Brombach, and in other foreign abbeys, it has been replaced with one built in modern times, which, in that instance, is still used for the same purpose; but no example exists, as far as I know, of an early scriptorium still remaining, although in some few cases, as at Furness and Fountains, its walls and windows are left. I have now described the whole of the normal buildings of a Cistercian convent, those, in fact, which surrounded the cloister; and to these on the present occasion I propose to confine myself. They constituted the principal domestic buildings of the earlier monasteries; and although in later times various other buildings were added to this central



group, within the precincts enclosed by the outer wall, their situation is so various, and their destination is, in some cases, so doubtful, that to enter upon a description of them here would be to carry us beyond the limits usually assigned to a paper of this kind. I may, however, mention the nature and objects of some of these additional buildings. The abbot's lodge, which I have reason to believe consisted originally of a single chamber over the kitchen, is often found constructed in later times as a detached building, on the east side of the central group, and became an important structure of two stories, the lower one being his kitchen, furnished with his own fireplace, and the upper one his living room, both finished with some degree of elegance. It is found thus planned and situated at Fountains, Jervaulx, and Netley. The lower apartment, or kitchen, was vaulted, and supplied with its own arched watercourse, to carry off the kitchen refuse. Close to the abbot's lodge was his private chapel; this exists still at Fountains and Jervaulx. At Furness his dwelling-room appears to have been over his chapel, and his kitchen was an octagonal one adjoining the latter. When the abbot was a mitred one, and was lord of the manor, or possessed local jurisdiction, the abbot's hall was a building of considerable importance; we have noble examples of this structure at Fountains and at Furness, in both of which abbeys it formed, with the lodge and the chapel, an important group; in both cases the hall has been destroyed, but the whole of its foundation walls remain, and the plan of the building is still traceable and perfectly plain. The infirmary was another building of importance; examples occur at Fountains, Furness, and Croxden. The hospitium, or guest-house, is a building so frequently referred to in ancient chronicles that I was first led to suppose, as I now believe erroneously, that it must have formed part of the cloister group. It is probable that it was a two-story building, designed similarly to the *fratry* and *domus conversorum*, with a day-room below, and a dormitory above. There is just such a structure both at Fountains and Furness amongst the outlying buildings within the abbey precincts, which may have been used for such a purpose. The abbey mill, or its site, or traces of one or the other, are to be generally found on the stream which waters a Cistercian valley, and the resources of which were utilised in so many various ways, an examination and description of which might not be without its use even in the present day. The last building which I have to notice is the abbey gate-house. One of the earliest of these gateways, and a very magnificent one it is, exists still at Kirkstall Abbey, the whole of the conventual buildings of which appear to have been carried out at once, and completed according to the original design within twenty years of their commencement. Remains of the outer wall of the convent, enclosing the whole precincts, are often to be found about ruined abbeys, even in this country, incorporated with modern restorations of it; and in some cases, as at Furness, it exists almost entirely. Throughout the whole of the foregoing remarks, it must be borne in mind, I have been endeavouring to describe the plan of a Cistercian monastery as it existed in the middle of the twelfth century. Before the close of that century changes had been introduced in the plan of the church, which are too important to be passed over without notice. Whether it was St. Bernard himself who set the example in his new Conventual Church of Clervaux or not, it is certain that many of the Cistercian churches built in the latter part of the twelfth century show a development of choir, and an increase of chapels about their east ends, which is in striking contrast with those of the earlier churches of the order. At Byland, commenced about A.D. 1170, and also at Abbey Dore, we have, as well as aisles added to both sides of an elongated choir, also a series of eastern chapels, along the whole of the east end. We find a similar arrangement at Ebrach, and Riddagshausen in Germany; whilst in France this development takes an apsidal form, with radiating chapels, current in that country, and of which the choir of Pontigny, added to the earlier transitional choir, is a beautiful example. In England this fashion was also followed at Croxden, built at the close of the Transitional Period, where part of one of these circular radiating chapels remains to attest the real design. Still later we have in England also the noble-aisled choirs of Fountains and Rievaulx with the eastern transept of Fountains, resembling the nine altars of Durham

Cathedral, built both, in the Lancet Period, in substitution and in prolongation of the earlier choir of the Transitional Period. And in the following period we have the English examples of Tintern and Netley, with the enlarged square-ended choir, and the foreign one of Altenberg, in Germany, with its apsidal termination, bringing this increased development down to the middle of the thirteenth century. In all other respects the church and the conventual buildings of the Cistercians remained the same, up to this point of time, in their plans and in their general treatment, as we find them in the commencement of the twelfth century.

On Thursday, the members of the Institute visited Easby Abbey and Richmond. Easby Abbey was reached by rail soon after eleven. Mr. James Fowler gave an account of the curious series of pictures representing the seasons which encircle the chancel walls of the old church within the ruins. Mr. Edmund Sharpe then gave a description of the abbey. From his remarks the visitors learned that this Abbey of St. Agatha was founded in the year 1152, by Roaldus, Constable of Richmond Castle. It was inhabited by canons of the Premonstratensian order. The house was surrendered in 1535, by Robert Bampton, the last abbot. Very little of the earliest structure remains, but it would appear that the Scropes rebuilt it. At the dissolution, the screen belonging formerly to the chantry of the Scropes was conveyed to Helmsley Church. The gateway of the Abbey is beyond the parish church, a building of the early Edwardian period, supporting the record room. Nearest the church is the most magnificent remain, a noble refectory with a window, in the Geometric Decorated style. The second side window from the east appears to have contained the reading gallery. The refectory floor was supported by a central series of arches. To the west is the great kitchen, preserving its fireplace, to the north of which are the other culinary offices. The buildings exhibit a fine series of interlacing arches. Returning to the great window of the refectory, to the north is the chapter-house, over it the scriptorium. A door (blocked) led into a strange small tower between the chapter-house and the refectory. North of the chapter-house is the church. The north wall contains two sepulchral recesses, still retaining portions of colour, and said to have covered the remains of Roaldus and his lady, the founders. More northerly still are the abbot's lodgings; and still further on the right-hand side, the abbot's oratory, containing a small piscina.

Richmond, about a mile distant, was then visited, and after luncheon with the Mayor, the company repaired to the Castle, which was described by Mr. G. T. Clark. The "Manual" furnished to the members states that the year 1071 is given as the date when Earl Aian began to erect his castle. The original structure may have been a humble attempt at fortification, for no part of the present remains seems older than Conan's Keep. The walls of the enceinte enclose five acres, the keep stands at an angle, and is placed so as to defend the weakest position. In Robin Hood's tower is a vaulted chapel of St. Nicholas, 13ft. long, by 10ft. wide, and 12ft. high. In the afternoon many of the members took occasion to visit in small parties the other places of interest in the town. Principal among these was the Trinity Chapel, in the Market-place, described in the "Manual" as a masterpiece of decoration:—"The chancel gone, the nave divided from the tower by a dwelling-house, the south aisle destroyed, the north aisle divided into two stories, the ground story composed of shops, the upper portion, after being the Consistory Court and Will Office for the Archdeaconry of Richmond and Royal Peculiar of Middleham, has recently been restored to the church." Mr. Longstaffe, from whose book the above facts have been extracted, says that there was probably a Norman entrance to this church highly enriched. Other members of the Institute visited the Grey Friars, St. Martin's, and St. Mary's churches.

On Friday, Lord Talbot de Malahide read a short memoir of the late Mr. Albert Way, the founder of the Institute.

Mr. E. Sewell (Ilkley) read a paper on some ancient sepulchral remains discovered at Ilkley on the 8th of May last. The relics were found in a position near the road leading to the so-called Rombald's Moor, on the slope of the hill some 200 yards from the outer eastern wall of the Roman station, about 3ft. deep, several circular walls of rough stones, covered over with slabs of

stone about 9in. across, very rough and very angular. The coverings having been removed (one of which was a red tile, unfortunately broken), the hollows were found to contain urns of the usual kind found in ancient Celtic and Roman British burial-places. These urns were filled with spent charcoal and calcined bones, all of which bore evident traces of the action of fire. The following day these uneducated and careless excavators came upon a rude vault, lying east and west, which, on further boring, was found to be of a rectangular form, covered with a thin stone slab, 3ft. 4in. long by 2ft. 6in. broad, the bottom slab being twice as thick as the upper one, and measuring 4ft. 11in. by 2ft. 9½in. The sides were built of rough sandstones, without mortar, and the depth was about 13in. On removing the upper covering there appeared the outline of a human form, as if it had been imbedded in ordinary brick clay. Amongst the rubbish thrown out the various ornaments were found, rings, bracelets, an amber whorl, beads, and broken glass. A portion of grit-stone of a much harder texture than is generally found around Ilkley was also turned up, having the appearance of a portion of some rude statuary. Three urns were taken out—one in a perfect state, about 8in. high and 4½in. across the mouth, the bottom diameter being 3in.; it is unornamented, and similar to several found in the south of England. A second was partly broken by the excavator's pickaxe. The third was quite demolished; this was rudely marked with wavy lines slightly indented. All of them were filled with charcoal, earthy remains, and calcined bones. The ornaments found were of jet and composition, also a bone handle to a boring tool of some kind, a quantity of very clear white glass. Two days after the above relics were taken out a metallic ring was found, but unfortunately the finder made away with it, and all efforts have been unavailing to get a sight of it, or even recover the treasure.

An excursion party left Ripon at noon, for Castle Dykes, proceeding thence to Tanfield and afterwards to Snape, Clifton Castle, and Bedale. The first stoppage was at Castle Dykes, where the excursionists alighted to view the interesting Roman remains which have lately been uncovered in a field there. Of these remains the following is stated in the "Manual":—"This Roman station was first explored in 1866, when two rooms with hypocausts were discovered in the north-west corner of the field. Here the mosaic pavements were found to have been uprooted by the plough. In April of this year the exploration was resumed and by a fortunate chance a bathroom was immediately hit upon. This has led to the discovery of a long range of buildings, those west of the entrance gate into the field having been no doubt the offices, and those on the right of the gate having been the more sumptuous rooms. The fact has been indicated by the pavements, baths, and hypocausts which have been found up to this time." An interesting paper was read by Mr. Lukis with regard to the excavation. The next stoppage was at Tanfield. The little church at this place was entered, and Mr. Bloxam made a few remarks upon the five effigies known as the Marmion monuments. The old gateway, which alone remains of the castle, was next seen, and Mr. Clark explained the position occupied by the castle in former times. From Snape Castle the excursionists drove to Clifton Castle, from whence, after luncheon, the company left for Bedale about five o'clock. Here a few minutes were passed in viewing the old church, and the excursionists returned by train to Ripon.

The programme on Saturday was fully carried out, though in a somewhat hurried manner. The first visit was to the ancestral home of the Scropes, at Bolton Castle. The structure was explained by Mr. Clarke. It dates from the time of Edward III., and was eighteen years in building. Here Mary Queen of Scots was confined for a short time, and Colonel Scrope defended it during the Civil Wars. A subsequent governor, Colonel Chaytor, held it until forced to eat his horses, and then capitulated. The castle was then dismantled, and the ruins alone remain. Wensley Church is remarkable for its old carved woodwork of the Scrope screen taken from Easby Abbey. The church is full of heraldic insignia, and its brasses and monuments were described by Mr. Bloxam. The Saxon stone marked "Donfrid," which has been so often engraved, was minutely examined. The register of Wensley has a touching entry relating to the desertion of the inhabitants during the plague of 1563.

The great attraction of the day was Middle-



ham, long the seat of the Nevilles and the home of the king-maker. It was the favourite residence of Richard III. Here he established a deanery, and here it is believed the last heiress of the Beauchamps, the widow of the king-maker, died in "great streights." It was the scene of Bulwer's first historical novel. Mr. Clarke's eloquent exposition of its history and fortification was listened to with great interest. The Norman keep still exists in the centre of the later and massive work. The remains of the hall and chapel excited much attention and admiration. Within these walls luncheon was served. Time did not permit of a thorough examination of the ruins, so the visitors hastened on to meet Mr. Edmund Sharpe at Jervaulx, for a further illustration of the manners, habits, and home of the Cistercians.

There is but little more than a ground-plan of Jervaulx Abbey to be seen, but thanks to the Marquis of Ailesbury, what remains is admirably kept, and its sepulchral memorials are of the highest interest. It was founded by the Earl of Richmond in 1156, and its architectural remains partake of the pure Early English character. It was in its glory in 1537, and the Dissolution destroyed it utterly. The last abbot was hanged, and his signature may yet be traced in the Tower of London. It was not until the commencement of the century that the site of the abbey was recognised, so utterly was it destroyed.

On Monday a special train left Ripon about half-past nine in the morning, and proceeded by Thirsk Junction to Coxwold. The church, which is dedicated to St. Michael, contains several fine monuments; and a small house not far from the church was the residence of Laurence Sterne, the author of "Tristram Shandy," while curate here. The short drive from Coxwold to Byland Abbey was quickly accomplished. Byland Abbey was founded in 1143 by Roger de Mowbray, son of Nigel de Albini, and his wife Gundreda, daughter of Hugh de Gurnay. Nine years earlier thirteen monks had left the Lavignian Abbey of Furness and had begun the building of its daughter monastery of Calder or Caldre, on lands given to them by Ranulph de Meschines, Earl of Chester and Cumberland. A hostile invasion of the Scots drove them from this place, but the refuge which they sought at their old home of Furness was denied to them. The fame of the good treatment shown by Thurston, Archbishop of York, and the new foundation of Fountains, induced Gerold, abbot of the destroyed house, to apply to him. He gave letters to Roger de Mowbray, by whom and by whose mother Gundreda the monks were formally received and established at Hode. Gerold then went to Savigny to obtain relief from his subjection to Furness, which was granted in 1142. The situation of Hode was found to be unsuited for the foundation of a monastery, especially as the community was rapidly rising both in numbers and in possessions. In 1143, therefore, Roger joined with his mother in granting out of her dower lands to the monks, Bella landa Super Moram, or old Byland, where for five years they remained. Their next resting-place was Stocking, under Blakhow Hill, somewhat to the west of the site of the existing ruins. It was not till 1177 that Byland Abbey was occupied by the monks. Mr. Edmund Sharpe explained the leading features of the abbey, remarking that the remains consisted simply of those of the Abbey church, the whole of the conventual buildings having been either destroyed or they were under the sod. He drew attention to the character of the work and the nature of the architecture, saying this abbey was perhaps one of the most illustrious examples of that interesting period of which he had before spoken, in which we see English art asserting itself for the first time in the history of this kingdom. He dated the commencement of that period at 1145, and brought it down to 1190. He was tolerably certain as to when this church was commenced, because the monks had established themselves at Old Byland somewhere about 1140. In 1143 they removed to Stocking, where they erected a small church and other buildings, and remained there for thirty years. On account of their great sanctity the monks were supported by the landowners on all sides, and they then commenced the erection of Byland Abbey. Having been in possession of a church and conventual buildings, they were in no hurry to remove, and did not come here till 1177. The year 1170 was therefore about the time when this grand building was commenced. The building was begun, as was always the case with Cistercian buildings,

at the east end, and on looking at the largest fragment of the church—its west front—they would find slight progress beyond what was found at the east end—at least an archæologist would find that actual progress in the work which they might expect to find, considering that it occupied twelve or fifteen years in its construction. Here they found arches of decoration, with the pointed arch, and they saw three of the earliest lancet windows that existed in this country. They also found that the arches of the side aisles were circular, although very pointed. About thirty years ago he had visited this place, but he was sorry to see that a great deal of the stonework had been pulled down since then. He regretted that there was so much ivy about the walls, and said it was a fact to be noted in this place that Lady Ailesbury had resolutely cut through the stems of all the ivy at Jervaulx, and he trusted the proprietor of this place would do the same. If he did not its fate was sealed. The buildings were perhaps one of the earliest Cistercian buildings which was divided into three parts—the ground-story, the blind-story, and the clerestory. A peculiar feature about it was the enormous circular window at the west end. There was no appearance that that window ever had spokes. It was filled probably with woodwork which sustained the glass, but to the best of his belief there was no stonework about it. Having called attention to the triple shafts carried by a corbel, the choir, and other points of interest, Mr. Sharpe said the history of this building had yet to be traced out, and there was no site that he would like better to have the liberty and the means of excavating than this abbey. The excursionists then resumed their seats in the carriages, and a start was made for Rievaulx Abbey. Rievaulx was the earliest foundation of the Cistercians in Yorkshire, dating from 1131, about three years after the first Bernardine monks had arrived in England. Mr. Sharpe explained the leading features of the Abbey, and again noticing the ivy, said that care should be taken to prevent the ivy making inroads into the masonry, and it had to be watched more than anything else about these buildings. Proceeding on their journey the excursionists drove to Helmsley, where, in the court-yard of the ruined castle, luncheon had been provided in a marquée erected for the purpose. Mr. G. T. Clark then gave a short discourse upon the castle, which was built and fortified by Robert de Ros. It was forfeited to Richard I., restored by King John, and remained the residence of the family till the reign of Henry VIII. In the reign of Charles I. it was defended under the governorship of Col. Crossland, who ultimately surrendered it to Lord Fairfax. The castle was afterwards partially restored by George Villiers, Duke of Buckingham. Having inspected the portions of the castle which still remain, the excursionists walked to the railway station, where a special train was in readiness to convey them to Gilling. This place was reached shortly before six o'clock, and the company at once proceeded to Gilling Castle, the road to which passes through a fine avenue of trees. The castle has been in the possession of the Fairfax family since the reign of Henry VIII., and is now owned by Mrs. Barnes, a descendant of the family. The principal feature of the present structure is the dining-room, which is thus described in the "Manual":—"The great dining-room, commonly called the Elizabethan room, in its renovated state, is one of the very finest specimens of the age which have remained to our day. It measures within the wainscot 32ft. 5in. by 22ft. 2in. and 17ft. 3in. in clear height. The oriel is 14ft. 6in. by 10ft., measuring within mullions. It is lighted by three beautiful windows of stained glass inserted along with the oriel windows when the room was refitted. The glass is in a high state of preservation. The date is below the dial in the lower pane of the right-hand of the south window, with the name of the artist employed in blazoning the arms—'Bernard Dininckhoff, fecit, 1585.' This window represents the arms of the Stapyltons, the bay window of the Fairfaxes, and the east window of the Constables. The room, up to the height of about 12ft., is wainscotted with oak, the mouldings richly carved, and the panels, 75 in number, are all inlaid with flowers, frets, and other patterns, so delicate and so varied as to confirm, in a sort, the tradition that they were designed and perhaps even executed by the ladies of the family and their handmaidens." The company then returned through the garden to the station, and arrived at Ripon shortly after eight o'clock.

In the evening a conversazione was held in the temporary museum, when the objects of special interest were explained.

On Tuesday a meeting of the Historical section was held in the Town Hall at 11 a.m.

Mr. C. Drury E. Fortnum, one of the hon. secretaries, read a letter received by Mr. Joseph Burt, hon. secretary, from Sir George Gilbert Scott, with reference to Ripon Minster.

Mr. Fortnum then read a paper by Mr. Joseph Bain, F.S.A., Scotland, on "The incursions of the Scots into Yorkshire in the 14th century."

The concluding general meeting was held at 12 o'clock. Votes of thanks were successively tendered to the Marquis of Ripon, the Corporation, contributors of papers, &c., and others, and a list of new members read over. It was also announced that next year's meeting would be held at Canterbury. In the afternoon the Bishop of the diocese preached a sermon in Ripon Minster in connection with the visit of the Institute.

## BUILDERS' BENEVOLENT INSTITUTION.

THE 27th annual meeting of this Institution was held yesterday (Thursday) afternoon at Willis's Rooms, St. James's, the President, Thos. Robinson, Esq., (Cubitt and Co.) in the chair. The Secretary, Mr. A. G. Harris, read the Annual Report, which, after thanking the subscribers and friends for their continued support to the Institution, stated that the Directors have purchased the sum of £893. 4s. 2d. Stock 3 per cent. Consols—£722. 14s. 3d. for the Relief Fund, and £170. 9s. 11d. for the Building Fund, making a total of £17,529. 14s. 2d. Stock, viz., £13,988. 13s. 9d. for the Relief Fund, and £3,541. 0s. 5d. for the Building Fund. The Directors have received notice that the late William Todd, Esq., of Wellington-road, St. John's Wood, has bequeathed the sum of £500 to the funds of the charity. The number of pensioners elected during the past year is four, and the number of pensioners deceased during the same period is three. The ball, which took place in January last, under the superintendence of Mr. I. T. Bolding was a great success, and realised a profit of £69. 4s. 6d. to the Institution. The Report concluded by stating that the Directors are taking active steps to increase the subscriptions to the Institution among the various branches of the building trades, and that George Dines, Esq., had consented to become President of the Institution for the ensuing year. The balance-sheet showed the total receipts during the year to be £2,841. 12s., and the total expenditure, £2,455. 16s. 11d., leaving a balance in hand of £385. 15s. 1d. On the motion of Mr. George Plucknett, seconded by Mr. Thomas Stirling, it was resolved that the report and balance-sheet be adopted and printed. Resolutions of thanks were then passed to the Patrons, to the President for the past year (Thomas Robinson, Esq.), to the Vice-Presidents, to the Trustees, to the Treasurer (George Plucknett, Esq.), to the Directors, to the Secretary and Stewards for Annual Ball, to the hon. Auditors, and to the hon. Solicitors, for their services during the past year. George Plucknett, Esq., was re-elected Treasurer; and the retiring Directors, with the exception of Mr. J. E. Lawford, were re-elected, Messrs. Charles Bussell and W. J. Mitchell being elected new directors. The hon. Auditors, Messrs. S. H. Head and J. H. Hunter, were also re-elected; and on the motion of Mr. Plucknett, seconded by Mr. T. G. Smith, Mr. George Dines was elected President of the Institution for the year ensuing. A vote of thanks to the Chairman concluded the proceedings.

## NOTES IN THE STREETS.—II.

LATELY, a few structures have sprung up in our streets which show an effort to break through the stereotyped street facade. In Cheap-side, within a stone's-throw of Bow Church, ingenuity has been taxed on two buildings side by side of opposite styles—one being a free treatment of Italian, the other Gothic of rather grotesque character. In both instances a commendable spirit is shown to give prominence and character to a narrow frontage. Both have their main windows recessed under a bold arched framework of masonry, if we may so term it; or, the projecting side piers are arched over, the second floor windows, the interfenestral spaces being



recessed. The Italian front—the premises of Messrs. Lake and Turner—show for the ground or shop window a bold bracketed lintel, and instead of the ordinary flat cornice, a segmental moulding, springing from end-cut blocks as abutments, crowns this lower story. Over this the window front is recessed between rusticated piers or quoins, and are ranged in triple lights, the first floor windows having semi-circular deeply-soffit arches resting on square pilasters, and the arched heads are relieved by gabled tops; the second floor tier is marked in the centre by a projecting balconette of half-round plan. The façade is roofed by a circular corbelled roof of zinc with rolls; the parapet is also relieved by a dormer. We believe Mr. Roumieu is the architect.

Next door, the treatment is on the same principle. Deeply-shafted side piers are carried up and arched by a pointed and moulded arch, which springs from elaborately wrought capitals, the under arch, or drop mould, being curiously tilted at springings, and supported by short shafts of red granite corbelled out from the main shafts in a very awkward manner. A like freakish treatment is the way the building is finished at the summit. Over the arch already noticed, the windows are small and shafted, the centre one standing out over the keystone of arch as angular; above this, the façade—because it appears all in one—slopes back at a slight angle, and its brick face is relieved by slight projecting apertures in the manner of a broached spire. We certainly do not admire the treatment. If this sloped summit is really the roof, the distinction does not appear to warrant the assumption. The windows are in pairs. The shop window has a moulded lintel, its ends being carried by boldly-wrought segmental corbels. Above the windows are of a Burgundian character, with ogee hoodmoulds and finials. A central shaft carries a sculptured figure, apparently of David holding a harp; the masonry behind is carved with chequer or diaper. While there is an excess of capriciousness shown in the detail generally, one cannot withhold the admission that its author, Mr. Roumieu has stamped the design with an impress of poetic fancy in keeping with the purpose of the premises, which are those of Messrs Keith and Prowse.

In Farringdon-street, at the corner of Ludgate-circus, Mr. Thompson, architect, has also hit upon an arrangement of façade which sufficiently departs from the routine rule of shop-fronts to call for notice. Unpretending in appearance, the premises in question, which are for shop and business purposes, exhibit a certain amount of variety in having its front wall broken by a series of alternate recesses of a few inches deep. Each house has a recessed face, which includes the windows, and a narrower width of projection which embraces the entrance. This alternation of projection and recess is not only pleasing in itself, but lends itself to the arrangement of the doorways with remarkable effectiveness. The door-opening forms the centre of the each projection, its jambs appear as projecting pillars on each side, and these doorways are further emphasised by being of stone, and surmounted by pediments of the same material, the main façade being of white brick. The objection to wide unbroken sheets of glass in shop windows, is, by this means, overcome, though the whole of the recess between two projecting doorways is occupied as windows. No overwhelming cornice cuts off the upper from the lower windows, the shops having plain beams which stop against the projection. The windows (of stone dressings) above are large, filled in with mullions and transoms of wood, and the continuity of the vertical wall spaces is uninterrupted. A varied façade is the result, though this is attained with remarkable lightness, and with a considerable degree of architectural merit and simplicity. All cornices and projections are very slight.

Mr. Roberts, of Lawrence Pountney-lane, has, in the new premises for Messrs. Braham, in Bridge street, Blackfriars, given another instance of simple yet not commonplace treatment. We have alluded to the general features before, and will simply call attention to the windows and other dressings which connect the parts of the façade, instead of separating them, as is too often the case. The ground-floor windows are divided by moulded cast-iron, square-faced, uprights, which support the stone lintel, and divide the glass in two without reducing the breadth of window. The reveals are also notched back, and are corbelled over again at the top, and the window, as a whole, is a good example of common-sense treatment—a rare quality in art.

## ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETIES.

**ANCIENT RUINS IN ARIZONA.**—In the report of the American Smithsonian Institution for 1872 (just to hand), Mr. J. C. Y. Lee announces the discovery of very extensive building remains in the heart of the Puial mountains in Arizona, in the centre of the Apache country. The remains are situated in a beautiful valley of not more than 150 acres in extent; no walls remain, but the stone foundations are distinct, and were easily traced. There were at least twenty or thirty rooms, some large and others small. Some pieces of broken earthenware were discovered in the neighbourhood, better finished than those now made by the Indians, and apparently of different composition. Mr. Lee concludes that the ruin is either traceable to the Jesuit occupation of the district or that it is an ancient Aztec or Toltec building, and inclines to the latter opinion on the ground that the place is too remote and inaccessible for the Jesuits to have reached it.

**BIRMINGHAM AND MIDLAND INSTITUTE.**—The second walking excursion this season of the archaeological section of this Institute was made on Saturday. Pinley Abbey was first visited, and then Yarningale, Beaudesert, Wootton Wawen. The visit to Yarningale was especially interesting. The hill is one of the earthworks referred to by Mr. J. T. Burgess in his paper recently read to the section, wherein it is described as an outwork to the camp at Barmoor. It appears, however, that some further researches into the etymology of Yarningale have since led Mr. Burgess to conclude that the hill is a burial place, and that its name signifies the "grave of the stranger." As Mr. Burgess has announced his intention of making some excavations on the spot, this question will probably be satisfactorily settled.

**BRITISH ARCHÆOLOGICAL ASSOCIATION.**—The following is the programme of arrangements for the 31st annual meeting of this Association. The meeting will be held at Bristol in the week between August 4 and 11, under the presidency of Mr. K. D. Hodgson, M.P. Excursions will be made to various places of interest in the surrounding district, including Cadbury Camp, a Saxon church at Bradford-on-Avon, Thornbury Castle and Church, Iron Acton Cross, Camp at Sodbury, a fortification on Worle-hill, Cheddar Cliffs, &c. Bristol Cathedral and the famous church of St. Mary Redcliffe will be visited. Among the papers already promised to be read at the evening meetings are the following:—"On Unpublished Historical Documents at Bristol," by W. De Gray Birch, Hon. Palæographer; "On the Records of Merchant Adventurers," and "On Heraldry of County Families connected with Bristol," by J. De Haviland, York Herald; "On Thornbury Castle," by Mr. L. Roberts, F.S.A.; "On the Seals of the City of Bristol," by Mr. J. R. Planché, Somerset Herald; and "On the See of Bristol and its Bishops," by Mr. S. J. Tucker, Rouge Croix.

**EXETER DIOCESAN ARCHITECTURAL SOCIETY.**—The quarterly meeting of this Society was held on the 23rd ult., the Rev. F. Sterry in the chair. Mr. B. C. Gidley, one of the hon. secretaries, read the quarterly report, which stated that the committee could not approve of the plan for the proposed restoration of St. Bartholomew's Church, Nymet Rowland, in consequence of the many and serious alterations proposed in the architectural character of the church, but had recommended a modified plan, in which the distinctive character of the church would be carefully preserved. A special meeting of the Committee was held on the 26th December, with reference to the question of the Cathedral reredos, at which a sub-committee was appointed, who subsequently recommended that a general meeting of the Society should be called for the purpose of discussing the subject. The Committee also adopted a series of resolutions (which appeared in the BUILDING NEWS at the time\*) affirming that the exclusion from, or restriction of, the use of art in our places of worship, would inflict a serious injury both in religion and art, and declaring that it was the bounden duty of thoughtful Christians to cherish and defend the use of sculpture and the sister arts in our churches. Having referred to some proposed works at the parish churches of Axmouth, Branscombe, Colyton, and Musbury, and St. Michael's East Teignmouth, the report continued: "With regard to the new reredos in the Cathedral, about which there is now so much

contention, your Committee feel that, *pendente lite*, it would not be fitting that they should say much. On the broad principles which underlie the question now at issue—technically between the Chancellor of the Diocese and the Chapter, but virtually between the Chancellor and the whole artistic world—this Society has uttered its mind in no uncertain sound in the series of resolutions already quoted in the report; while into the minor questions, comparatively speaking, of the Chapter's rights over the fabric of the Cathedral, whether such rights be absolute or subject to the same or like conditions as those which define and restrict the freehold of the parson of the parish church, your Committee do not seek to enter." Mr. Hayward reported that there was a balance of £233 in the Treasurer's hands, but the Society had a book in the press, and several grants had to be paid. The reports of the Committee and Treasurer having been adopted, Mr. F. Drake, artist in stained glass, of Cathedral-yard, Exeter, was elected a member. Mr. W. H. H. Rogers, F.S.A., then read selections from a voluminous paper on the sepulchral stone effigies in the parish churches of North Devon, and other memorial and monumental sculptures in the county between A.D. 1250-1550. The paper was illustrated with numerous cleverly-executed drawings. A short discussion ensued. Votes of thanks having been passed to Mr. Rogers and the Chairman, the meeting terminated.

**THE LEEDS ECCLESIOLOGICAL AND NATURALISTS' SOCIETY.**—On Saturday the above society visited Pontefract. The excursionists first visited All Saints' Church, where a paper was read by Mr. T. W. Tew, J.P., of Carleton. The party next visited the ruins of the historical castle, under the guidance of Mr. T. W. Tew and Mr. R. H. Holmes, of Pontefract, where the different objects of interest were pointed out, including the chamber where King Richard II. was murdered, the Well, the Keep, Magazine, St. Clement's Chapel, the Round Tower, the Guard House, &c.

**THE NORTH OXFORDSHIRE ARCHÆOLOGICAL SOCIETY** had its yearly excursion on Thursday the 16th inst., leaving Oxford station by drags at nine o'clock for Thame, where the members were met by the Rev. E. Greensill, the curate, who conducted the visitors through the church and prebendal premises, and the rooms and dormitories of the Grammar School. At Chinnor, the Rev. Sir William Musgrave met the excursionists and took them through the church, constructed of flint, with stone dressings, and having a saddle-back tower, and adorned within by sixteen large oil paintings by Sir James Thornhill, and an altar-piece—a Dead Christ—by another artist—probably a copy from some ancient example. The drawbridge of the moated castle of Shirburn was lowered to admit the party, who were conducted through the dwelling-rooms and libraries. Watlington was the next point, where the Town Hall is more curious than ornamental, and the church roofless, under restoration.

**THE RUINS IN IONA.**—The condition of these ruins has for some time past been engaging the attention of the Duke of Argyll. Last year, Mr. R. Anderson, architect, Edinburgh, visited the island, and drew up a report, in which he offered various suggestions for the repair and partial restoration of the buildings. On digging into the mounds at the foot of the walls, Mr. Anderson found several relics of ancient sculpture; and, altogether, saw enough to satisfy him that a thorough search would bring to light many characteristic features of the old cathedral. What he recommended, therefore, was to have the mounds opened up, with the view at once of clearing the ground and of recovering the valuable portion of their contents. The material so recovered he proposed to employ in making good defects in the cathedral walls, thus avoiding the error which was made some years ago in repairing the church of S. Oran in such a way as entirely to destroy its architectural character. Mr. Anderson has received from the Duke a general commission to commence operations, and will accordingly proceed to the island with a suitable staff of workmen.

## SCHOOLS OF ART.

**CRYSTAL PALACE SCHOOL OF ART, SCIENCE, AND LITERATURE.**—The annual award of medals and certificates to the successful students in the art classes of this school was made on Saturday. Mr. Louis Haig and Mr. H. G. Hine officiated as

\* Vol. XXVI., p. 79, Jan. 16, 1874.



judges of the water-colour paintings (Mr. Edward A. Goodall, master), and awarded the silver medal to Miss Thwaites, of Harcourt Villa, Upper Norwood; the certificate of merit to Miss B. Whitworth, of the Knowles, Dulwich Wood Park; Miss Stokes, of Gipsy-hill, obtained commendation. Mr. J. Woolner, A.R.A., and Mr. T. Thornycroft were judges of the modelling in clay (Mr. W. K. Shenton, master). Miss Kate Green, of Enmore Park, South Norwood, gained the silver medal, and the certificate was given to Miss Helena Teulon, of Penge. Models by Miss Ellwood, of Dulwich Wood Park, Miss Macduff, of Ravensbrook, Chiselhurst, and Miss Ellen Cooper, of Sydenham-hill, as well as several drawings from the antique and from animals, were especially commended. An exhibition of the works submitted in competition was afterwards opened in the private studios of the school, at the north end.

MR. TOM HUNT has been awarded this year the "Cresy" prize, value £5. 5s. 0d., by the Lambeth School of Art, for his compositions, Mr. Story, A.R.A., and Mr. Hodgson, A.R.A., being the adjudicators.

#### PARLIAMENTARY NOTES.

**THE PIETRO DELLA FRANCESCA PICTURE.**—On the supplemental vote for the National Gallery on Monday, the recent purchase of the picture by Pietro della Francesca was brought under notice by Mr. Hankey, and his criticisms called up Mr. Isaacs, who justified the acquisition of the picture and its addition to our national collection. It was, he said, a rare and genuine work of art. It had not been "restored" in the sense of being damaged. But being painted on vertical panels, which had become warped, these had been straightened, and some slight abrasions on unimportant places painted over. The picture had been bought in the strife of competition. Many foreign galleries had contended for it, and this country had acquired it by an advanced bidding of £50. He believed that the picture was now worth considerably more than had been paid for it. The vote was finally approved.

**THE RIVER LEA.**—Mr. J. Holms, on Tuesday, asked the President of the Local Government Board whether his attention had been called to the pollution of the river Lea at Tottenham by sewage, and to the fact that a large number of dead fish were found lining the towing-path. Mr. Selater-Booth said the attention of the Local Government Board had been drawn to the state of the river Lea, and the Board had for many months past been urging upon the local sanitary authorities the desirability of attending to the state of the river. He had received a communication from them which led him to believe that steps would be taken to remedy the nuisance complained of.

#### CHIPS.

It is proposed to build a new Vestry Hall and offices for Kensington, at a cost of £30,000 or £40,000.

Some land in Leadenhall-street, amounting to about 13,000ft., has been sold for £52,000.

The British Museum has received a bequest from the late Mr. S. James Ainslie, consisting of a numerous collection of drawings in water-colours and pencil, and of etchings illustrative of a work on Etruscan antiquities.

A thorough restoration of Olney Church has been decided upon. Several efforts have been made at various times to erect in Olney some fitting memorial of the poet Cowper, but they have all proved unsuccessful.

We recently announced that Mr. O. E. Coope, M.P., had promised to rebuild Whitechapel Church, at a cost of £15,000. It is now stated that a difficulty has arisen between Mr. Coope and the Trustees, Mr. Coope, it is alleged, having accepted a design which the Trustees declare is even worse than the present building!

It is intended to thoroughly repair the parish church of Pembrey, Carmarthenshire, under the direction of Mr. Withers, architect. The contemplated expenditure is £1,500.

Workmen are now engaged in the demolition of St. Antholin's Church, Watling-street, properly St. Anthony's, and the interior has almost entirely disappeared. The foundation is very ancient, being the gift of the canons of St. Paul's in 1181. The church was restored under the direction of Sir Christopher Wren in 1682. Another church, the demolition of which will be commenced as soon as the necessary arrangements are completed, is that of All Hallows, Bread-street.

## Building Intelligence.

#### CHURCHES AND CHAPELS.

**CHESTER.**—On Thursday week the foundation-stone of the Northgate Congregational Church, Chester, was laid. The front of the edifice is built of Stourton stone. There is a square tower surmounted by an octagon-shaped spire, on the northern side, which is 100ft. in height. The size of the main building is 72½ft. by 38½ft. in the interior. There will be accommodation for about 500 persons. The style is Gothic of the thirteenth century. The cost is estimated at £3,240. The architect is Mr. T. M. Lockwood, and the builder Mr. T. Richards.

**HAMMERWICK.**—On Monday week the church of St. John the Baptist, Hammerwick, was reopened, after restoration, at a cost of £3,000. The new edifice is built in the Early English style, the plan being a double parallel-gram, forming a nave and chancel with a north aisle, which is separated from the nave by three arches, which are supported on moulded and carved columns. At the end of the north aisle is a small organ chamber and vestry. The tower forms the west entrance to the church. The chancel, which is the most important feature of the interior, is very large for a church of such dimensions. It is constructed entirely of local stone. The architects were Messrs. Newman and Billing, of Tooley-street, London. The church will seat about 250 persons. The carved stone pulpit, brass lectern, altar-rails, standards, &c., were supplied by Messrs. Jones and Willis, of Birmingham and London.

**HANTS DIOCESAN CHURCH ASSOCIATION.**—At the last quarterly meeting, held on Saturday, grants were made to St. Mary's, West Cowes, £50; £25 for enlargement of an infant school-room in Holy Trinity parish, Winchester; £50 to school at Soberton; £30 as additional grant to school at St. Peter's, Cheeshill; £100 was granted for the restoration of the parish church at Havant; £100 towards building a parsonage at Eastleigh; £100 towards the purchase of a site for a parsonage at Hedge End, where a new church was consecrated last week. Applications from Burghclere and Greatham were postponed.

**HIGH WYCOMBE.**—On Tuesday, the 21st inst., the foundation-stone of a new Primitive Methodist Chapel, with schoolrooms, vestries, &c., at High Wycombe, Bucks, was laid by Lieut.-Col. the Hon. W. H. P. Carington, M.P. The new buildings will comprise a large chapel, with end and side galleries, to seat 500 adults, schoolroom under, and in the rear three spacious classrooms, washhouse, stoves, offices, &c. The main building is of considerable height, being nearly 70ft. from street to ridge, and will be a conspicuous object in the town. The style is thirteenth century Gothic, the materials of washed stock and red bricks and stone. The fittings are to be in pitch-pine. The total cost will be about £3,500, including site. The heating apparatus is to be by Haden and Son. The contractor is Mr. Reuben Spicer, of Wycombe, and the architect is Mr. Arthur Vernon.

**KENNINGTON.**—It is proposed to expend £1,200 in various improvements in St. Mark's Church, Kennington. The whole of the interior is to be cleansed and decorated, and a design for carrying out the work has been submitted by Messrs. Heaton, Butler, and Bayne, of Garrick-street, Covent Garden, at a cost of £550. Several improvements were made at this church two or three years ago, under the direction of the late Mr. S. S. Teulon, and the works now proposed will be carried out according to plans prepared by Mr. Forster.

**LONDON.**—The foundation-stone of the new church of S. Philip the Evangelist, Old Kent-road, was laid on Tuesday. It is also intended to build a parsonage house and schools in conjunction with the church, the cost of which will be £3,700. The style is Gothic, with a tower, from which will spring a pointed spire to the height of some 150ft. The exterior of the walls of the building is to be composed of Kentish rag, and the inside of brick. Mr. Coe is the architect, and Messrs. Nixon and Sons the builders.

**SCARBOROUGH.**—The new Roman Catholic Church of St. Peter, Scarborough, was opened on Wednesday week. The nave and chancel of the church are a great contrast in point of ornamentation to the sanctuary. The latter is lavishly decorated with mural paintings, whilst the former

is comparatively plain, there being only a few small paintings along each side wall, interspersed with pictures in frames. The principal windows are of stained glass. The reredos and altar are elaborately carved. The furniture of the sanctuary is of carved oak. The whole of the work has been carried out under the direction of Mr. Hodgkinson, of Cork, from designs furnished by the architect of the church, Mr. George Goldie, of London; the painting is by Mr. Chas. Goldie, and the sculpture by Mr. Earp, of London.

**SHEFFIELD.**—The Church of St. John the Baptist, Owlerton, Sheffield, was consecrated on the 29th inst. by the Lord Archbishop of York. The building is of simple Early Gothic character, designed to combine economy with solid construction and fitness for the services of the English Church. The plan has nave and north and south aisles, 70ft. 6in. long, chancel 24ft. in length, with roomy vestry and south porch. The interior is lofty, being 48ft. high to the apex of nave-roof, which is open-timbered. The chancel roof is polygonal in form, the panels being plastered and decorated in distemper. The whole of the internal arches are of brick, and the piers of nave of stone, alternately circular and octagonal on plan, with bold conventional caps, carved by Mr. Earp. The tiling of chancel is simple, with richer diaper inside the rail, by Godwin. The sedilia and credence-table are of stone; the reredos is of glass mosaic, the centre panel representing Our Lord as the Good Shepherd, the side panels containing sacred monograms; the frame being unpolished black marble. The choir-fittings and pulpit are all of oak, and, together with the other woodwork, are very creditable to Mr. Seth Summers, by whom this work was carried out. The church is warmed by Messrs. Longden, and lighted with gas by Mr. Wallis. The wallstone used in the building is from Oughtybridge, and the dressed stone from Wadsley, the mason's work being executed by Mr. James White. The total cost has been about £3,350, the architect being Mr. J. B. Mitchell Withers, of Sheffield.

**STOKENHAM.**—Some time since it was determined to thoroughly restore the parish church of Stokenham, Devon, in consequence of the arcade leaning to the south to such an extent as to endanger the fabric. The church was erected in the early part of the fifteenth century, bearing date 1421, and was dedicated to St. Michael. It comprises a nave, choir, and chancel, with north and south aisles and transepts, the whole being of very good proportions. The chancel was rebuilt a few years ago. With regard to the other portions of the church, all the old pews have been swept away, and open seats with solid bench-ends substituted; the western organ gallery has been removed, and the organ re-erected on the north side of the choir. By this removal the tower has been opened out, and a fine arch brought to view. A new open pitch-pine roof has been erected over the nave, north aisle, and choir, but in the south aisle it was found that the old oak roof was in a sufficiently good state of preservation to warrant its retention. All the plaster has been removed, and the walls pointed. The ancient oak rood-screen will be preserved. Seven new windows, of Beerstone, in the Perpendicular style, corresponding with the style of the church, have been introduced, three of them having four lights and the others three lights. They are glazed with ribbed Cathedral rolled glass, with a modicum of stained glass. The new pulpit is of Beerstone, and is octagonal in shape. The floor has been relaid with Maw's tiles by Mr. Luscombe, of Torquay, and a new heating apparatus has been fixed by Messrs. Garton and King, Exeter. The organ has been restored and re-voiced, with the addition of twelve pedals, lower part of diapason carried down, and a katolphon introduced, by Messrs. Hamlin and Hawkins, of Newton Abbot. The general works were undertaken by Mr. Bragg, of Paignton, and subsequently by Mr. Webber, of Plymouth; the stonework of the windows and the pulpit is by Mr. Chinnock, of Paignton, the whole being carried out under the direction of Mr. Lidstone, architect, Dartmouth. The cost has amounted to about £1,600.

**WESLEYAN CHAPEL BUILDING.**—At the annual Conference of the Wesleyan Methodists, held this week at Camborne, it was stated in the last annual report that the erection of 129 chapels had been sanctioned in the year, at a cost of £214,955. The total outlay sanctioned for the year, including also schools, organs, and ministers' houses, was £337,037, the largest amount on



record. The debt is only 16 per cent. Thirty-nine of the chapels are in places where Wesleyanism did not previously exist, and the total new accommodation is for 23,000. The total amount expended on new chapels and the reduction of debt in the year was £378,017. In twenty years £3,233,322 have been expended on 4,201 buildings.

## BUILDINGS.

**GLASGOW.**—The Glasgow City Union Railway Company having secured the various properties in the line of the proposed extension of the City Union Station, from Dunlop-street to St. Enoch-square, operations for the erection of the new St. Enoch-square terminus will be at once entered upon. The plans have been prepared with a due regard not only to the present, but to future requirements, and the new terminus will be one of the most commodious in the United Kingdom. Howard-street will form the southern boundary, the front range of tenements facing Argyll-street the northern, and Dunlop-street and St. Enoch-square the eastern and western boundaries respectively, Maxwell-street, from Howard-street northwards, being closed as a public thoroughfare. The principal entrance will be before St. Enoch-square, on the eastern side of which it is proposed to erect, in the Gothic style, a large range of offices, the northern wing of which will extend eastwards to Dunlop-street.

**GLASGOW.**—Plans for the extension of the Kelvingrove Museum are completed. The principal addition will consist of a hall 85ft. by 40ft., with a gallery at a height of 14ft. The building will be in the Roman style of architecture. To the west of this extension will be another hall, 38ft. by 18ft., which it is intended to devote to the purposes of an aquarium. The works will cost £7,000. The aquarium referred to will be in addition to the one proposed to be constructed by the Aquarium Company of Glasgow (Limited), who proposes to raise £100,000, in 10,000 shares of £10 each, and who have provisionally secured an extensive site in the centre of the city on which to erect a marine aquarium, concert room, large hotel, restaurant, shops, warehouses, offices, &c.

**HAMPSTEAD.**—A new Fire Brigade station has just been erected at the corner of Heath-street and Hollybush-hill, Hampstead, for the Metropolitan Fire Brigade. Mr. G. Vulliamy, superintending architect to the Metropolitan Board of Works, designed the building, which is built with stock bricks, faced with Allen's red Suffolk bricks, relieved with Portland stone dressings and Pether's patent moulded bricks. It accommodates six men (three married and three single), two horses, and one engine, and is two stories in height. A lofty look-out tower, in which is fixed a clock, has also been provided. The work has been carried out by Mr. J. High, of Lower Clapton, at a cost of about £2,200. Mr. J. Frampton, of Fulham, executed the carving.

## SCHOOLS.

**CAMBOENE.**—New Sunday-school buildings in connection with the Wesleyan Chapel, Camborne, were opened on the 22nd ult. The ground and first floor of the new schools consist of two large rooms 64ft. by 40ft., the lower one 14½ft. high, the upper room, which rises towards the centre, being in its highest part 17½ft. high. The lower room, by means of six massive folding doors, can be converted into two rooms. The cost was £3,000. Mr. Ellison, of Liverpool, was the architect; Messrs. Dunstan, Mills, and Williams, the builders, and Mr. Bond, of Tehidy, clerk of the works.

**EDINBURGH.**—The Edinburgh School Board is about to erect new schools, from designs by Mr. R. Anderson, to accommodate 750 children. The style is Gothic, and the external elevation shows a central gable flanked on either side by a tower-like structure with hipped roof. Mr. Anderson has also in hand designs for the schools to be erected by the Board in Hamilton-place, Stockbridge, and in Causewayside, each of which is intended to accommodate 500 pupils.

The Metropolitan Asylums Board have determined to provide additional standpipes and hose at the Caterham Asylum, for protection from fire, at a cost of £500.

On Tuesday the memorial-stone of the new Primitive Methodist Church in Roxburgh-street, Greenock, was laid. The structure, which is to cost £2,000, is in the Early English style. The architects are Messrs. Salmon, Glasgow.

## TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the page allotted to correspondence.]

To OUR READERS.—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces. All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

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## A COMPETITOR IN TROUBLE.

SIR,—In case competition plans are invited, and two competitors only appear, is it just for the Board to invite one of the competitors to give an opinion at all in the matter previous to a decision having been arrived at? In the case under my notice the competitors have received no notice of a decision having been made, neither have either sets of plans been returned. —I am, Sir, &c., INJURED MORTAL.

Kidderminster.

[It would be indecently unjust for the Board to consult one of the competing architects. We cannot answer the latter part of the above letter, as we do not know what were the specified conditions of the competition. —Ed.]

RECEIVED.—W. S. T.—T. R. and Son.—J. D.—E. S. C.—P. and Sons.—W. J. S.—Carpenter.—P. Bros.—G. F. S.—H. W. T. and Sons.—M. and B.—S. and S.—E. T.—E. W.—T.—W. T.—B.—J. P. S.—J. H. B.—W. J. B.

M. SEAFOR (How is it likely that we could say whether your design is suitable for illustration in the BUILDING NEWS without seeing it? Would you like to buy a pig in a poke?)—AUDUS (The design you wrote about was not a premiated one).—ARCH (Not suitable for "Intercommunication.")

## Correspondence.

## COMMITTEE ON THE AFFAIRS OF THE INSTITUTE.

(To the Editor of the BUILDING NEWS.)

SIR,—The resolution to appoint this Committee is remarkable, but the list of names is yet more astonishing. A conference attended by architects from all quarters of the kingdom has just been held for the discussion of subjects that concern the profession at large, and the widest scope was given to the expression of opinion. Delegates from kindred bodies were there, and the intercourse was cordial and unrestrained. There the Institute had objects in common with the rest; but here her own peculiar and intestine circumstances are to be laid open and discussed, so that she might well be excused if found a little tight-laced, stringent, and exclusive as to the admission of her examiners. It would seem nothing short of a vital necessity indeed that her inmost revelations should be made to those alone upon whose absolute and undivided allegiance she can count. Yet this searching committee has been chiefly formed of members of the Architectural Association! Of the eight Fellows five are peculiar and three epicene, but the four Associates are wholly of the latter class. This proportion of seven and five is open to derangement by the fact that one of the Fellows is a country member, and also by the uncertainty of Professor Donaldson's interest in the business. It is not improbable, therefore,

that the seven members of the Association will meet not more than three purely Institute men. One can hardly expect that a Committee thus formed can satisfy the vast majority of Fellows and Associates who yield a loyal and complete adherence to the Institute. It seems far more likely that they will regard its existence as an impertinence, and overrule its conclusions, unless it first votes the dissolution of the Council for appointing it, and then commits suicide.

ESPRIT DE CORPS.

## BUILDING STONES IN SMOKY TOWNS.

SIR,—I have seen the various letters on the above subject which have appeared in your paper since you published the letter I wrote, but have not had an opportunity of replying thereto; indeed, there is scarcely need that I should reply, save that my silence might be construed as assenting to the conclusions of your correspondent "T." The question at issue is a simple one, viz., the best material for building in smoky towns? It may be regarded under the heads of cleanliness, cost, and durability. In my letter I endeavoured to show that granite, even when polished, is not the most cleanly material for use in smoky towns. I also showed from examples given that it is not the most durable, and I spoke inferentially as to cost.

The examples I quoted for cleanliness are all in the City. I might have increased the number of those examples *ad infinitum*, as any one may see in all our leading thoroughfares. The pedestal of Peabody's statue cries out loudly for the waterman's brush. The illustrations referred to of the Duke of York's monument, &c., hardly come under the title of smoky towns, otherwise one might instance as beautiful specimens of granite work, the Prince Consort's Memorial in Hyde Park, the numerous monuments and mausoleums in Kensal Green, Highgate, and other suburban cemeteries.

When walking through Paternoster-row, Fleet-street, Ludgate-hill, Queen Victoria-street, Cheapside, Poultry, Cornhill, Gresham-street, Threadneedle-street, Lombard-street, and other streets in the City, too numerous to mention, a visitor casting his eye right or left would find numerous examples of buildings where the lower story is embellished with granite and the upper stories in Portland stone, the Portland bearing a favourable contrast as to cleanliness, aye, and as to durability too, with the granite. With reference to cost, if the gentleman had built buildings in London in granite (he classes the whole of the oolites and beautifully-coloured millstone grits and fine-grained sandstones under the one generic term *freestone*) he would have found the cost of Granite from 25 to 30 per cent. more than most other building stones. I have recently erected a granite building, one of three, in a very plain style, and I would put up two buildings of the same size and style, out of the very best Portland, for the same sum of money, or out of some of our fine-grained durable millstone grit at fully 30 per cent. less than granite.

Theory is very well, but facts are stubborn things.—I am, Sir, &c., SAMUEL TRICKETT.  
Victoria Stone Wharf, Millwall, E.  
July, 1874.

## Intercommunication.

## QUESTIONS.

[3402.]—Asphalte for Bowling-Alley.—I am about to construct a bowling-alley with an asphalte floor. I should be glad if any of your readers would kindly give me their experience as to what kind of asphalte would be best suited for the above job, and by whom I could get it done?—B.

[3403.]—Church Committees.—Will any of your numerous correspondents versed in legal points give me some advice as to my action in the following case? About two years ago I received instructions from a building committee, or rather from the chairman, to prepare plans for making additions to a church. These were made, with all the required detailed estimates, tracings, &c. About a year ago the vicar was presented to a better living, since which time nothing has been done. The new vicar, however, does not acknowledge his responsibility, and the members of the committee are equally unwilling to acknowledge any services in the event of no work being undertaken, and as such as deny their having anything to do with the instructions I received from the late vicar. I have the instructions in writing, though not officially, from him. Can I claim for my services already done, as I am not so sure of anything being done, or, if likely, that I shall be employed under the new circumstances?—G.

[3404.]—Surveying Hilly Ground.—In surveying hilly ground, would a surveyor give the surface area of the hills, or only the area covered by the base of said hills; in other words, the horizontal area? Which method is generally followed? I know the argument, that you cannot grow more trees on a hill-side than you could grow on the horizontal area the hill stands on, &c., but I cannot divest my mind of the opinion that an occupier of a hilly farm derives an advantage, if charged only the horizontal area. In the Ordnance Maps the computed distances must be the distance gone over, whether hilly or otherwise, I suppose.—LIVE AND LEARN.



[3405.]-An Attic Base.—I want a rough sketch of the above, with the mouldings named; also to know if there is any variety.—VI ET VIRTUTE.

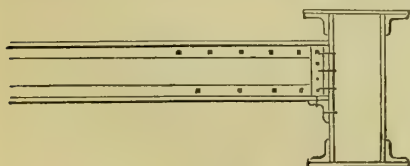
### REPLIES.

[3386.]-Liabilities of Architects.—Your correspondent's prospects at law in this, as in most matters, depend upon a great many chances that do not usually enter into a litigant's calculations, not the least of which would be the acuteness of his counsel and the humour of the jury, &c. But he should not endeavour to evade his liability in the affair, as by his own showing a gross fraud has been "effectuated," as Yankees say, owing to his "laches." He should most certainly try and saddle the right horse. Clearly the contractor is the party to make restitution, and let him inform that worthy that he is liable to be imprisoned for "larceny." The imposing of an inferior or deficient material, in the face of a definite agreement, is decidedly an indictable offence at law, and many instances may be cited, notably the contractor for the bronzes of the Nelson column, &c. The application of the criminal law to many of these practices would bring a good many sharp speculators to their senses. The fact of the fraud being perpetrated with the assistance of, or through the agency of, the architect's certificate, is an aggravation of the offence, and not a palliation.—CUMBRIAN.

[3386.]-Liabilities of Architects.—Neither "M. G." nor "L.," who question my opinion, show the smallest reason for so doing. They refer me to what certain legal writers have said about "usages." Now, there is certainly no usage for the architect to pay for all defaults of the builder discovered after the final certificate, the defaulter going scot-free. My position is this: A builder having contracted to do certain works must, in law and in fairness, do them. Nothing can satisfy his contract but this, or else the production of the architect's written order under the clause relating to authorised omissions. The architect is not authorised by the contract to certify that the work is complete when it is not complete, and if it is not complete the production of such a certificate does not make it so; for there is nothing to make such a certificate (like the architect's decision in cases of dispute) final and conclusive. The client's remedy is against the builder. If he cannot pay, or if it costs money to make him pay, the client can then sue the architect for negligence, and if he can prove it before a jury, he must stand the consequences. That, I think, is the law; if not, we ought to have a clause in future building agreements to the effect that no certificate of completion shall excuse the builder from doing what he contracted to do and has been paid for doing, but has omitted without being authorised to do so. To make an architect a guarantee for a fraudulent builder would be a wrong on architect and client; for the architect is not necessarily a capitalist, while the builder is, or ought to be, and he can and ought to pay, especially as it is he who has done the wrong. Practically, an honest builder always makes good any such defect as that pointed out by "Nemo," lest he should be suspected of dishonesty, while a fraudulent builder would do it, if possible, more readily for fear of being found out. There can surely be no hardship in making this builder do now what he was paid for doing six years ago.—B.

[3390.]-Girders.—Another plan of connecting small and large girders is to bolt two pieces of angle plate one on each side of the flitch of small girder, and of about the width of half the flanges. By this means the small girder is steadily fixed as well as supported, as, of course, bolts would also pass through the flitch. Some railway bridges are constructed in this manner.—J. H. B.

[3390.]-Girders.—A good way of connecting the two girders is to bolt the cross girder on to the web of box girder and rivet it to a small angle-iron bracket



underneath. It is better to do without cast iron in such work if possible.—R. J. G. R.

[3397.]-Window-Sashes.—Thanks to "Delta" for his reply. I will turn to the BUILDING NEWS of the dates he mentions for the information, and also to Mr. B. Fletcher's able articles. I should like to be informed if any balance sashes have been utilised, and where they may be seen?—ENGINEER.

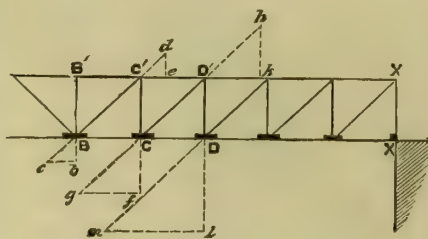
[3398.]-Strains.—The simplest plan of finding the strains is to draw the triangles of forces for the booms, suspending-rods, and braces, the weights being made equivalent by scale to the upright pieces. The strains on the braces would be weight  $\times$  sec. of the angle between the diagonals and the horizontal bars.—W. W.

[3398.]-Strains.—As requested by "Vi et Virtute," I send the following: Consider BX to represent half the girder shown in diagram 3361, and loaded, first, with weights W on the bottom flange. One-half only of the centre weight at B will be transferred to the abut-

ment X, the other half will go to the other abutment. At B, therefore, make the perpendicular Bb to represent  $\frac{W}{2}$  on any suitable scale; produce CB, and draw

be horizontally to meet it in C. The line Bc will represent on the scale the strain on the bar BC'. Produce BC' to d, making C'd equal to the strain on BC', and draw de, perpendicular; this will represent the strain on C'C. At C a weight, W, is encountered; which has to be carried on to the abutment X; therefore make the perpendicular Cf equal to  $(de + W) = \frac{3W}{2}$ . Pro-

duce D'C, and Cg will give the strain on that bar, and the vertical component, hk, of this strain will be the strain on DD'. In like manner, by making the perpendicular Df equal to  $(hk + W) = \frac{5W}{2}$  the strain on Dk is found, and so on to the end of the girder. The horizontal components, C'e, D'h, &c., of the strains on the diagonals, summed towards the centre, B', give



the strains on the parts of the flange, BC', C'D', &c. It will be seen from the above that the weights are all transferred by the bracing bars to the abutment. The

weight  $\frac{W}{2}$  at B starts, and on its way picks up the weights at C, D, &c., and carries them with it to the abutment X, the total load at that point being  $(\frac{W}{2} + W + W + W + W + \frac{W}{2}) = 5W$ .

Summing up these results we find that for a girder of the above form, loaded on the "bottom flange," there will be no strain on the centre vertical B'B, as the weight at B is carried to the abutments by the diagonals on each side of it.

On the diagonal B'C there is a tensile strain = cB.

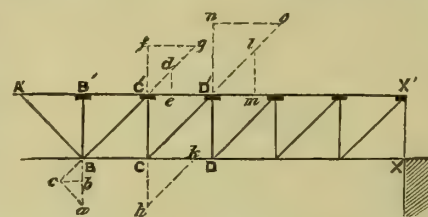
" vertical C'C " compressive " =  $de = \frac{W}{2}$

" diagonal CD " tensile " = Cg.

" vertical D'D " compressive " =  $hk = \frac{3W}{2}$

and so on to the end of girder. The strain on the last vertical X'X being compressive =  $\frac{9W}{2}$ .

2nd.—Consider the weights to be on the top flange. In this case there will be a compressive strain on the centre vertical B'B equal to the weight W at B; as



this weight must be transferred to the point B before it can be carried by the bracing bars to the abutments, at B draw the perpendicular Ba = W on any scale, and draw Bc and ac parallel to the two diagonal bars BC' and BA', then Bc and ac will represent the strains on those bars. Produce BC' and make C'd equal to cB, then the perpendicular de will represent, as before, the component of the strain going down C'C, but there is also the weight W at C to be carried down C'C; therefore make the perpendicular Cf =  $(de + W) = \frac{3W}{2}$  and

this gives the compressive strain on C'C. At C make Ch = C'f and hk will give the strain on CD', in like manner Dv will give the strain on DD, and so on to the end of the girder. Summing up these results, we find there is

On the vertical B'B a compressive strain = W

" diagonal BC' tensile " = cB

" vertical C'C compressive " =  $fc' = \frac{3W}{2}$

" diagonal CD' tensile " = hk and on

the end vertical X'X compressive " =  $\frac{10W}{2} = 5W$ .

This is a graphic method of finding the strains, and is perhaps the simplest; but the above results may be easily deduced by trigonometry.—R. J. G. R.

[3399.]-Pressure on Sluice Valve.—To find the pressure on valve it is necessary that the height of water in the cistern should be given, also length of main pipe C.—R. J. G. R.

### LEGAL INTELLIGENCE.

CLAIM FOR DILAPIDATIONS.—HILLS v. BRIGHT.—This was a case tried a few days ago at the Sussex Assizes, before Mr. Baron Cleasby and a common jury. The plaintiff claimed to recover damages for breach of covenant in the non-repair of certain premises at Lower Beeding, leased by the plaintiff to the defendant for twenty-one years, from March, 1854. The lease contained covenants binding the defendant to keep the premises in good repair; that he should paint the iron and woodwork inside every five years, and the outside every third year. For the plaintiff, Mr. Bartlett, builder, of Brighton, was called, and stated that the house was in a very dilapidated condition, through neglect. His specification of what was required to be done amounted to £47. Mr. Hills, the plaintiff, stated that the house had been out of repair for years. Mr. Farre, a surveyor, of Brighton, said his estimate of what was required to be done to put the premises in repair was £42. For the defence, it was shown that the defendant had, during the time he had lived in the house, spent nearly £150 in repairs, and that the house was now in a very fair condition. Mr. Frank Woolgar, builder, of Beeding, said the house was now in better repair than he had ever known it. Mr. Charles Dolby, architect, of Steyning, gave similar testimony, and stated that the house was 150 years old.—Verdict for defendant.

COMPENSATION CASE.—STREET IMPROVEMENTS AT IDLE.—On Friday week Mr. W. Gray, the under-sheriff, and a jury, met at Apperley Bridge to assess the value of certain property at Idle belonging to Mr. J. A. Ingleby, corn miller, Tadcaster, which the Local Board wished to acquire for the purpose of widening and improving Highfield-lane. Mr. W. B. Woodhead, surveyor, of Bradford and Idle, produced a plan showing the position of the property, and said that the value of it was 25s. per yard as building land, which would make the total value £1,067. 10s. The vendor was also entitled to 20 per cent. for compulsory sale. The jury assessed the value of the property at £1,104. 8s.

RIGHTS OF WAY, &c., IN THE CITY.—The Attorney-General v. Wrench.—The City of London Real Property Company v. Wrench.—Wrench v. The City of London Real Property Company.—These three causes were placed on the paper for hearing together on the 20th inst. They have occupied the attention of the Vice-Chancellor Sir C. Hall and his court at intervals for several days, and the last of them was disposed of on Wednesday. The object of the first suit was to establish a right on behalf of the public to a way at the end of St. Michael's-alley, near St. Michael's Church, Cornhill, in the City of London. The object of the second suit was to establish the right of the plaintiffs in it to a wall, or to part of the wall, as a boundary wall, in the same locality; and to restrain the defendants, who represented the parish, from building up another wall so as to interfere with the ancient and enlarged lights of the plaintiffs. The object of the third suit was to determine the rights of the parties in it with respect to an easement, or right of access, from one part of the property on the same spot to another. The Vice-Chancellor held, in the first suit, that the way in question was a public way; in the second, that the plaintiffs had failed to establish their case, and that their bill must be dismissed with costs; and in the third suit, after some little discussion, directed the matters in dispute to be referred to a surveyor, who was to say what the plaintiffs were entitled to for the increased easement which they offered to concede to the defendants. He added that if an arrangement could be arrived at, he thought there should not be any costs ordered on either side.

### STAINED GLASS.

BRADFORD.—The large east window in St. John's church, Horton-lane, Bradford, has just been filled with stained glass by Messrs. Powell Bros., of Park-place, Leeds. The subject is the Ascension.

WINTERINGHAM.—A two-light memorial window has recently been erected in the south aisle of the parish church of Winteringham. The subjects are St. John the Evangelist and St. Elizabeth. The artists are Morris and Company.

### STATUES, MEMORIALS, &c.

MACHYNLETH.—The foundation-stone of the Castle-reagh Memorial Clock Tower has been laid at Machynlleth. The Clock Tower will consist of a plinth course, the platform of which will be attained by steps, surrounded by an ornamental railing. On this platform is to be placed a fountain. The lower story will be a space 18ft. 2in. square, having open arches on the four sides, and buttresses at an angle of 55° sustaining each corner. The arches, with polished angle columns and carved caps, will be crowned by crocketed canopies and small figures holding bannerets in their hands. These figures will rest on each corner of the springing of the shaft or body of the tower, which is to be of Tremadoc stone, played at the angles, and will have a rampant course of Mansfield red stone on each side, with foliated loophole windows at distances all the way up. The shaft or body of the tower will rise from the groined ceiling of the arcade, and will be terminated by four enriched faces with angle pinnated turrets. The tower will be roofed by means of a stone-crocketed spirelet, terminated by a large iron vane. The dials will be framed in ornamental iron-work. The whole height of the tower will be 78ft. from the base to the top of the vane, and 48ft. to the centre of the dials. The architect is Mr. Henry Kennedy, of Bangor and London, and the contractor is Mr. Edward Edwards, builder, Machynlleth.



## Our Office Table.

**SCIENCE AND ART DEPARTMENT, SOUTH KENSINGTON.**—The tenth annual competition for the prizes of the Plasterers' Company, 1874, resulted as follows:—A Model in Plaster, for a group of flowers, foliage, or fruit, the size of the model not to exceed 29½ inches high by 21½ wide; any style may be chosen: For the best, £7. 7s., George Bedford, Torquay School of Art; for the second best, £4. George Jupp, St. Martin's School of Art. A design in Monochrome, an original design drawn in pencil or monochrome, and capable of being executed in plaster, in low relief, for the decoration of one panel forming a portion of the side of a room 18 feet in height: For the best: £8. 8s., Richard P. Lane, Belfast School of Art; for the second best, £5. 5s., William Leck, Glasgow School of Art.

**ROYAL INSTITUTE OF BRITISH ARCHITECTS.**—In conformity with a resolution passed at the last annual general meeting of this Institute, the following gentleman have been nominated by the Council to serve on the Committee on the Affairs of the Institute then appointed, viz.:—Follows: Messrs. T. Chatfield Clarke, F. P. Cockerell (Hon. Sec. Foreign Correspondence), T. L. Donaldson, T. Hayter Lewis, T. Roger Smith, A. Waterhouse, T. Worthington, and T. H. Wyatt. Associates: Messrs. E. B. Ferrey, R. Phené Spiers, E. J. Tarver, and T. H. Watson.

**BATHS AND WASHHOUSES.**—The Paddington Baths and Washhouses recently erected from designs by Mr. Lewis H. Isaacs, and described in the BUILDING NEWS a few weeks ago, appear to be a great success. It was stated at a recent meeting of the Vestry of Paddington that as many as 3,000 bathers have used the place in one day, and that during the past six weeks the income was £1,164, and the profits about £600. A similarly satisfactory account is given of the new Crown Baths at Kennington Oval, which, however, are a private concern, being owned by Mr. W. Higgs, the well-known builder of Crown Works, South Lambeth.

**THE CHARING CROSS APPROACH TO THE THAMES EMBANKMENT.**—The Metropolitan Board of Works had before it on Saturday last a block plan of the proposed new road from Charing Cross to the Victoria Embankment through the site of Northumberland House. The plan shows a road 90ft. wide, which is nearly the same width as the Embankment roadway itself. An amendment that the new street should be 80ft. wide was lost, and it was resolved that the street should be 90ft. wide, as shown on the plan. There was much discussion as to the width of the street, the majority of the speakers contending that such a street in such a situation could hardly be made too wide, Mr. Fowler remarking that the only doubt he had being whether the street ought not to be 100ft. wide.

**DESTRUCTION OF THE LIVERPOOL LANDING STAGE.**—A terrible fire which broke out on Tuesday afternoon at Liverpool resulted in the total destruction of the landing stage, one of the most complete structures of its class in the world. In 1847 the engineering skill of Sir William Cubitt put an end to the antiquated system of embarkation that had existed on the shoals of the Mersey for many years. He designed the George's landing stage, and that structure, which occupied a considerable time in formation, was, on the 1st of June of that year, fixed to the moorings to which it was attached until a few days ago, when it was removed to make way for a stage so adapted as to join that portion of the structure that was destroyed on Tuesday. It consisted principally of 39 iron pontoons and a wooden decking 5in. in thickness. In length it was 507ft., and in width 180ft. 9in.; its weight was 2,000 tons, and it could bear 40,000 persons. With the bridge, the total cost of the stage was about £40,000. The Prince's stage, also designed by Sir W. Cubitt at a cost of about £140,000, was opened in 1857, and a scheme by Mr. G. F. Lyster for the construction and extension of the two stages has only recently been completed. A few weeks since the George's Stage was moved and united with the Prince's Stage, and a structure was thus formed that was unrivalled in the world. It was upwards of 2,000ft. in length, and joined by seven bridges, one of which, the Pontoon Bridge, is 590ft. in length, and 38ft. in breadth. This Pontoon Bridge, which in itself cost £25,000, is said to be the only part of the structure saved.

**WHITWORTH SCHOLARSHIPS.**—The following is the list of candidates successful in the competition for the Whitworth scholarships, 1874:—William Martin, 20, metal turner, Wolverton; Robert A. Sloan, 18, engineer's apprentice, Birkenhead; William Sisson, 21, engineer, Gateshead; Frederick Stubbs, 19, engineer's apprentice, Derby; Thomas L. Daltrey, 20, draughtsman's apprentice, Newcastle-on-Tyne; Frederick H. Livens, 20, engineer's apprentice, Gainsborough.

### CHIPS.

The curious Manor Church which stands on the private park of Mr. Disraeli at Hughenden is about to be restored by Mr. Blomfield, at a cost of £5,000.

The parish church of Thorpe-le-Soken, Essex, is about to be restored.

Messrs. Dickinson and Co., of Ely-place, have purchased the copyright of Miss Thompson's next picture. The sum to be paid is £2,000.

A Grand Industrial Exhibition is to be opened on the 1st of September, at Louisville, U.S.

Among the MSS. disposed of at the recent sale of Sir W. Tite's library was the original of Burns' famous song "Scots wha hae wi' Wallace bled" which fetched £25. An American journal asks, How many "originals" of this famous song of Burns's there are? as the late Mr. Sumner left one to Harvard College.

The foundation-stone of a new Baptist chapel at Glyn Ceiriog, Denbighshire, was laid on Monday. The edifice has been designed by Mr. Richard Owen, of Liverpool, and the contractors are Messrs. Ellis and Jones, of Towyn. It is to cost nearly £1,300.

The memorial-stone of the new St. Marylebone Presbyterian Church was laid on Monday by the Lord Mayor. Messrs. Tarring and Son are the architects, and Messrs. Jackson and Shaw the builders.

Plans prepared by Mr. Wardrop, of Edinburgh, have been approved for the erection of a new Presbyterian Chapel of Ease, at Selkirk, to accommodate 600 people, at a cost of £3,000.

The Local Government Board has been memorialised to appoint an inspector to report on the present condition of the River Lea.

Messrs. Horne, Eversfield, and Co., will offer for sale by auction, at an early date, the whole of the valuable building materials, fixtures, and fittings, of Northumberland House.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHELVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB and SON,  
Makers to the Bank of England,  
57, St. Paul's Church-yard, E.C.  
And 68, & James' street, S.W.—[ADVT.] } London.

## The Timber Trade.

The following are the quotations for the present week:—

Per 120 12ft. 1½ by 11.		£	s.
Wyburg, best yellow	3 by 9	13	10
Quebec, 1st floated pine	20	20	0
" 1st bright	21	0	26
" 2nd	15	0	17
" 2nd floated	15	0	15
" 3rd bright	12	10	13
" 3rd floated	12	10	13
" 1st spruce	13	0	13
" 2nd	10	10	11
" 3rd	10	10	10
S. John's spruce	10	10	11
Geffe, 1st & 2nd white	3 by 9	13	0
" 3rd	3 by 9	11	0
" 2nd	3 by 9	11	15
" common	3 by 9	10	15
" 1st and 2nd yel.	3 by 8	16	10
" 2nd	4 by 9	16	0
" 4th	4 by 9	16	0
" 2nd yellow	3 by 9	15	10
" 3rd	4 by 9	15	0
" 4th	4 by 8	15	0
" 2nd	2½ by 7	14	10
Holmsund, 1st & 2d yel.	3 by 9	16	10
" 3rd yellow	3 by 9	15	10
Gothenburg, 1st yellow	2 by 5	11	10
" 2nd	2½ by 5½	12	0
" 3rd	2½ by 5½	11	0
" 4th	3 by 7	13	10
" 5th	2½ by 7	13	0
Hudikswall, 2nd	4 by 11	15	10
" 3rd	½ by 10	16	0
Husum, 1st & 2nd	2 by 9	16	0
" Pitch pine	15	0	15
Laurvig, 3rd white	3 by 9	11	0

			£	s.	£	s.
Ljusne, 1st yellow	3	by 9	16	0		
" 1st & 2nd yel.	3	by 8	14	10		
Petersburgh, 1st white,	3	by 11	13	15		
" "	3	by 9	13	10		
" 2nd white,	3	by 11	12	0		
" "	3	by 9	11	10		
Stockaviken, 1 & 2 yel.	3	by 9	16	0		
" 3rd yellow	3	by 9	15	0		
" "	3	by 8	14	10		
" 4th yellow,	3	by 9	14	10		
" "	3	by 7	14	10		
Sandarne, 1st & 2nd yel.	3	by 9	16	10		
Drontheim, 1st white	3	by 10	11	0		
" "	3	by 9	11	0		
" 2nd "	3	by 9	10	15		
" "					15	0

Per 120 12ft. 2½ by 6½.		£	s.
Dram, 1st & 2nd white	2½ by 6½	11	0
" 2nd white	2 by 4	9	0
" 3rd	3 by 6½	18	0
" 1st yellow	by 6½	11	10
" 2nd	2½ by 6½	11	5
" 3rd	3 by 6½	11	10
" 4th	2 by 4	10	5
" 5th	2½ by 6½	10	15
" 6th	2 by 4	9	0

Flooring boards (per square.)		£	s.
Gothenburg, 1st yellow	¾ by 6	12	6
" 2nd	1 by 6	14	0
" 3rd	¾ by 6	12	0
Frederickstadt, 1st yel.	¾ by 7	12	0
" 2nd	¾ by 5½	12	0
" 3rd	¾ by 5	12	0
" 4th	1½ by 6½	17	6
" 5th	1½ by 6	17	0
" 6th	¾ by 7	12	6
" 7th	¾ by 7	11	6
Christiana, 3rd yellow	¾ by 5½	11	0
Dram, 2nd yellow	1½ by 6½	17	6
" 3rd	1 by 7	13	6
" 4th	1½ by 6½	15	0

Per load of 50 cubic feet.		£	s.
Greenheart	160	0	200
Indian Teak	240	0	290
Ironbark	170	0	220
Riga fir	80	0	85
Memel and Dantzig crown	90	0	110
" best middling	80	0	100
" good mid. & 2d	75	0	90
" com. middling	70	0	80
Stettin	60	0	70
Swedish	60	0	65
" (small)	50	0	58
Yellow pine (large)	110	0	130
" Waney board	110	0	130
" small	80	0	90
Pitch pine	75	0	85
Ash	140	0	160
Quebec birch (large)	110	0	160
New Brunswick birch	85	0	110
Memel crown oak	110	0	160
Quebec oak	100	0	180
Red pine masts	100	0	120
Large yellow pine do.	80	0	130
Oregon do.	180	0	240
Kawrie do.	160	0	220

Per cubic fathom.		£	s.
Petersburg lathwood	10	0	11
Riga, &c.	8	0	9
Per 18ft. cube.		£	s.
Riga crown wainscot logs	120	0	135
" brack	95	0	100
Memel crown	95	0	110
" brack	75	0	85
Per mille of pipe.		£	s.
Memel crown oak staves	270	0	300
" brack	250	0	260
Dantzig, Stettin, &c.	220	0	240
Canadian standard pipe	80	0	85

## WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay. For samples and further particulars, apply to the MANAGER, at the Quarries Narberth-road, R.S.O.—[ADVT.]

### TENDERS.

**BERMONDSEY.**—For alterations to the clocks, &c., of St. James's and Bermondsey parish church, to allow of illumination at night.

Bermondsey Parish Church.

Smith and Son (accepted) £414 0 0

S. James's Church.

Smith and Son (accepted) £130 0 0

**CLAPHAM.**—For works at West House, for Mr. S. W. Cawston. Messrs. Habershon and Brock, architects.

Scriveners and White £1,698 0 0

Sharpington and Cole 1,623 0 0

Carter and Son 1,499 0 0

McLachlan 1,489 0 0

Manley and Rogers 1,470 0 0

**CROSSNESS.**—For the formation of a roadway from Pymstead to the Crossness Pumping Station of the Southern Main Drainage, for the Metropolitan Board of Works. Sir Joseph Bazalgette, engineer.

Webster (accepted) £7,500 0 0



DALSTON.—For parsonage house for the Rev. Dr Waldram.

Lawrence	£3,281	0	0
Sharpington and Cole	3,211	0	0
Browne and Robinson	3,196	0	0
Newman and Mann	2,996	0	0
Scrivener and White	2,980	0	0
Carter and Son	2,920	0	0
Manley and Rogers	2,887	0	0
Waldram and Co.	2,849	0	0

DALSTON.—For German Church, for the Trustees. Messrs. Habershon and Brock, architects.

Lawrence	£4,810	0	0
Carter and Son	4,798	0	0
Sharpington and Cole	4,787	0	0
Browne and Robinson	4,689	0	0
Manley and Rogers	4,550	0	0
Scrivener and White	4,493	0	0
Newman and Mann	4,186	0	0

LONDON.—For alterations and additions to 27, Moorgate-street, for Mr. A. B. Wormald. Mr. F. C. Dyer, architect. Quantities taken out by Mr. Henry Wm. Broadbridge.

Gould and Brand	£997	0	0
Perkins	993	0	0
Ward	900	0	0

LONDON.—For new hall, offices, &c., Blackfriars-road, S.E., for the London and Provincial Temperance Halls Co., Limited. Mr. J. H. Swan, architect. Quantities supplied by Mr. Edward Morfee.

Higgs, Hill, and Co.	£10,760	0	0
Burford	10,240	0	0
King and Son	9,696	0	0
Lucas Bros.	9,660	0	0
Elkington	9,607	0	0
Rider and Son	9,579	0	0
Cooke and Green	9,576	0	0
Deards	9,088	0	0

LONDON.—For alterations and repairs, 3 Crosby-square, City, for Mr. P. Davis. Mr. Charles Reilly, architect.

Norton	£598	10	0
Watson	496	13	0
Harrison	423	0	0
Staines and Son	364	0	0
Greenwood and Son	358	0	0
Heeps (accepted)	352	0	0

MANCHESTER.—For alterations to warehouses in Miller-street. Mr. Edmund James Sherwood, architect. Quantities by the architect.

Holt (accepted).....£1,500 0 0

MANCHESTER.—For warehouses, Thornley Brow. Mr. Edmund J. Sherwood, architect. Quantities by the architect.

Thomas (accepted).....£2,350 0 0

OLD FORD.—For the erection of stables for Messrs. Allan. Revised estimate.

Blackmoore and Morley (accepted) .. £897 0 0

OXON.—For enlargement of the vicarage house, Stoken-church. Mr. Arthur Vernon, architect.

Spicer	£228	0	0
Syred (accepted)	210	0	0

PORTSMOUTH.—For tramway depot, North End. Messrs. Davis and Emanuel, architects. Quantities supplied (on appointment by the builders) by Mr. J. Glenn.

Morey jun.	£2,250	0	0
Larcome	2,138	0	0
Burbridge	2,015	0	0
Ward	1,995	0	0
Cooper	1,968	0	0
Quick	1,889	0	0
Bramble Bros.	1,808	0	0
W. R. and C. Light (accepted)	1,790	0	0

RAMSOUTH.—For small school chapel, Gravel-lane circuit, Manchester. Mr. Edmund James Sherwood, architect.

Barker (accepted, total cost).....£650 0 0

SOUTHWARK.—For repainting St. Saviour's Workhouse, John-street, Blackfriars-road, for the Guardians of St. Saviour's Union.

Hart and Son	£121	0	0
Cloake (accepted)	109	0	0
Sayer	96	10	0

ST. GEORGE'S-IN-THE-EAST.—For renovating the interior of the Pauper Infirmary, for the Guardians.

Palmer	£545	0	0
Hollist	524	0	0
Thompson	389	10	0
Seed	349	10	0
Charlton and Martin	355	0	0
Johnston	329	0	0
Coombe	325	0	0
Derby	309	0	0

SURREY.—For alterations and additions at 79, Tulse-hill, S.W. Mr. Frederick Thomson, architect.

Maxwell Bros.	£617	0	0
Howard	600	0	0
White (accepted)	482	0	0

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COMPETITIONS OPEN.

CARDIFF, Sept. 23.—For designs for the proposed Free Library, Museum, and Science and Art Schools. Mr. E. Payne, Hon. Sec., The Wharf, Cardiff.

COCKERMOUTH, Aug. 12.—For plans for a girls' school. Mr. J. Fearon, Cockermouth.

HASTINGS, Sept. 24.—For designs for a new Town Hall, with police offices, lock-ups, public offices, &c. Premiums of £100, £50, and £25 will be given for the three most approved designs. Mr. G. Meadows, Town Clerk, 8, Bank-buildings, Hastings.

MAIDENHEAD, Aug. 15.—For plans for a system of works for the supply of water to the town. A premium of £25 will be given for the best set of plans. Mr. E. Davey, Town Clerk.

Geometrical and Encaustic Tile Pavements  
in every variety. Over Sixty New Designs at 6s. 6d. per yard super. "The Tiles are excellent, both in quality and colour."—BUILDING NEWS. "They are of great excellence in design—the material is not surpassed by any found in this kingdom."—*Art Journal*. "The patterns are remarkably good and effective."—*Gardener's Magazine*, &c. &c. Designs and sample Tiles free on application to HENRY C. WEBB, Tiles, Worcester. London House, 114, Victoria-street, Westminster. Mr. T. Pulling, Agent.—[ADVT.]

CONTRACTS OPEN FOR BUILDING ESTIMATES.

ABERDARE SCHOOL BOARD, Aug. 4.—For altering and extending the Herweim Joint Schools. R. O. Grey, Clerk to the Board, Town Hall, Aberdare.

ABERDARE SCHOOL BOARD.—Extension of time till Aug. 4.—For the erection of a mixed school at Penwynn; the erection of a mixed school at Caproch; and for alterations and additions to the existing schools at Cwmbach. R. O. Grey, Clerk to the Board, Town Hall, Aberdare.

ACCRINGTON, Aug. 10.—For the erection of a mission and school at Woodcock. Mr. W. S. Varley, architect, Blackburn.

ADMIRALTY, Aug. 4.—For the erection of a Coastguard station at Marazion, near Penzance. Director of Works Department, Admiralty, Spring-gardens-terrace, S.W.

BERMONDSEY, Aug. 3.—For the supply of 1,000 tons of best blue broken Guernsey granite. Mr. B. G. Wilkinson, Vestry Clerk, Maltby-street, Bermondsey.

DEWSBURY, Aug. 12.—Contract No. 1. For excavating, concreting, and laying down foundations, and erecting stone pillars to receive a cast-iron gasholder tank. Contract No. 2. For constructing and fixing a cast-iron gasholder tank, with columns and girders. Contract No. 3. For the construction of a stone gasholder tank. Mr. C. A. Craven, Engineer, Gasworks, Bradford-road, Dewsbury.

DONCASTER CORPORATION WATERWORKS, Aug. 18.—For the construction of a storage reservoir in the Silverwood Valley. Mr. B. S. Brundel, C.E., 1, Princes-street, Doncaster.

GRANTHAM.—For the erection of a hospital. Mr. R. Adolphus Came, architect, 6, Warwick-court, Gray's Inn, London, W.C. Quantities supplied.

GUISELEY, Aug. 6.—For the erection of a mill and boiler-house. Mr. G. Foggitt, architect, Guiseley, Yorks.

HEADINGLEY, NEAR LEEDS, Aug. 13.—For the erection of a villa near Oil-mills-lane. Mr. O. Fowler, architect, Britannia-buildings, Leeds.

HOBURDY LOCAL BOARD, Aug. 15.—For making about 15,000 yards of cast-iron socket pipes. Mr. J. Lumley, C.E., 14, Kirkgate, Bradford.

LANCASHIRE AND YORKSHIRE RAILWAY, Aug. 4.—For alterations and additions at Hipperholme Station, near waiting shed at Lightcliffe, roof and underbridge at Lowmoor, and additional waiting-room at Thornhill. Engineer's Office, Hunts Bank, Manchester.

LEEDS, Aug. 13.—For the erection of an Independent Mission-room in Accommodation-road. Mr. C. Fowler, architect, Britannia-buildings, Leeds.

LEICESTER TRAMWAY CO., Aug. 3.—For paving a portion of their tramway. Mr. C. Stretton, Belvoir-street, Leicester.

LLANELLY, August 3.—For the erection of a boys' and girls' school in the Old-road. Messrs. Wilson, Wilcox, and Wilson, Belmont, Bath.

MALVERN WATERWORKS EXTENSION, Aug. 10.—Contract No. 1. For the construction of a covered service reservoir. Contract No. 2.—For the construction of a storm water channel. Mr. J. E. Palmer, Surveyor, Malvern.

MARYLEBONE, Aug. 6.—For the construction of new brick sewers and other works. Surveyor's Department, Court House, S. Marylebone.

MIDLAND RAILWAY, Aug. 4.—For the erection of a new passenger station at Cromford. Engineer's Office, Midland Railway, Derby.

MIDLAND RAILWAY, Aug. 4.—For the erection of a goods warehouse and offices at Staveley. Engineer's Office, Midland Railway, Derby.

MIDLAND RAILWAY, Aug. 4.—For alterations and additions to the Wellington Station, Leeds. W. Austin, Clerk of Works, Leeds.

MIDLAND RAILWAY, Aug. 4.—For the construction of a small reservoir, and other works at Sheffield. Engineer's Office, Midland Railway, Derby.

NEWPORT (MON.) GAS CO., Aug. 8.—For the construction of a brick gas-holder tank. Mr. H. Bowen, Engineer, Cardiff.

NEWCASTLE-ON-TYNE, Aug. 10.—For the erection of a Lutheran Church. Mr. F. R. N. Haswell, architect, North Shields.

NORTH EASTERN RAILWAY, Aug. 12.—For the construction of the Castle, Eden, and Stockton Railway and branches. Mr. C. N. Wilkinson, Secretary, York.

NORTHUMBERLAND, Aug. 8.—For the erection of schools at Dudley, Biggs Main, and Benton-square. Messrs. Austin and Johnson, architects, 15, New Bridge-street, Newcastle-on-Tyne.

PADDINGTON, Aug. 3.—For certain works at the Vestry Hall, Harrow-road. F. Dethridge, Vestry Clerk, Vestry Hall, Harrow-road.

PLUMSTEAD, Aug. 5.—For the construction of 1,242ft. run of 24in. half brick barrel culvert, and 1,456ft. run of 18in. half brick barrel culvert in Burnt Ash Hill and Bromley-road. Mr. F. F. Thome, Lee-road, Lee, S.E.

S. GILES', CAMBERWELL, Aug. 5.—For paving certain streets and roads. Mr. G. W. Marsden, Vestry Clerk, Vestry Hall, Camberwell.

SOWERBY BRIDGE LOCAL BOARD, Aug. 10.—For widening the county bridge over the river Calder. Mr. J. H. Smithurst, Surveyor, Town Hall, Sowerby-bridge.

TRINITY HOUSE, Aug. 3.—For the construction of a timber grove and two mineral oil stores at Orford Light-house. R. Allen, Secretary, Trinity House, E.C.

TWICKENHAM, Aug. 5.—For the construction of a sewage reservoir; about 1,000 yards of brick, and about 17,000 yards of pipe sewers, with surface water drains, &c. Mr. Ramsey, Surveyor to the Board, Twickenham.

WAR DEPARTMENT CONTRACT, Aug. 6.—For internal painting and whitewashing, and external painting at the officers' barracks, Dover Castle. Commanding Royal Engineer, Royal Engineer Office, Dover.

WAKEFIELD, Aug. 4.—For additions and alterations to a house. Mr. O. W. Richardson, architect, Bank-buildings, Westgate, Wakefield.

YEADON CEMETERY, Aug. 8.—For erecting boundary walls and making roads. Mr. G. Foggitt, architect, Guiseley.

YEADON, Aug. 7.—For the erection of a villa. Mr. G. Foggitt, architect, Guiseley, Yorks.

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## THE BUILDING NEWS.

LONDON, FRIDAY, AUGUST 7, 1874.

## CISTERCIAN ARCHITECTURE.\*

NO ONE better than Mr. Edmund Sharpe is capable of giving us the result of a correct and thoughtful inquiry into any of those special developments of architecture which distinguished the Middle Ages. Such an inquiry is that before us upon "The Architecture of the Cistercians." Mr. Sharpe could hardly have taken up a more interesting order of monasteries, or a more valuable branch of Mediæval architecture. For this, and the other works on architectural detail which he has given us, we owe to him a lasting debt of gratitude. For one especial reason do we think Mr. Sharpe deserves well of the architectural profession, and that is because he has remained faithful to our own country and art. He has devoted the best part of his life to English Mediæval architecture, and the purest phases of it; and his work is more valuable from being untinctured by those foreign predilections and tastes which mark nine-tenths of our more fickle Mediævalists.

In this work on Cistercian Architecture we have the result of many years' travel and study of the principal Cistercian abbeys in England, France, and Germany. This study has resulted in the establishment of the conclusion, that the old Cistercian monks followed certain rules of their own, both in the plan of their conventual buildings and in the design of their churches. These peculiarities of structure and style are specially interesting, and were referred to by Mr. Sharpe in a lecture delivered by him some time ago to the Cambridge Camden Society, and also before the Royal Institute of British Architects in 1871. The conclusions to which these examinations led, induced Mr. Sharpe to carefully examine the early chronicles and history of this Order, and this examination showed that the Cistercians, for at least the first 200 years of their existence, distinguished themselves from other religious orders.

As we gave last week (page 149) a full report of Mr. Sharpe's paper on Cistercian Buildings read before the Ripon meeting of the Royal Archæological Institute, and which contains the substance of the present work, we will here simply touch upon the main conclusions. Of the three principal monastic orders—I. the Benedictine; II. the Præmonstratensian; and III. the Cistercian—the last was an offshoot from the Benedictine, and arose apparently out of the extreme laxity which prevailed in those abbeys. The order arose from three monks of the Abbey of Molesme, in Burgundy, who, quitting their own abbey in despair, retired to a secluded spot in the diocese of Chalons, in the West of France, and established the Convent of Cîteaux, under the protection of Otho, Duke of Burgundy, in 1098. A stricter rule, founded upon that of the order of St. Benedict, prevailed among the new converts, and the order rapidly extended under the great St. Bernard, whose zeal, piety, and devotion to the cause established a large number of monasteries of this order. Luckily, the greater portion of the remaining abbeys left to us of this order belong to the period of the twelfth and thirteenth centuries, during which period, or nearly so, the stricter rules and purity of the Cistercian life prevailed. In England we have many good examples of this monastic order of remains, though they are more numerous in France and Germany. Within a period of 200 years from the date

of St. Bernard's appointment as abbot of Clervaux, no less than 1,200 abbeys were founded, erected, and endowed; and Mr. Sharpe says that this number shows an uniformity of disposition of the monastic buildings, as well as in design. One of the most striking peculiarities of the Cistercian monastery pointed out is the love the order had for valleys and secluded spots removed from the busy haunts of men; and this was invariable. In no single case, our author says, has high land been selected. This rule, indeed, was enjoined by a statute of the General Chapter of 1134. (See "Nomasticon Cisterciense.") How beautifully, for example, Netley is ensconced within a wooded vale on the banks of the Southampton estuary!

As regards the plan of the conventual buildings, there is always a remarkable uniformity; so marked, indeed, as to enable one to lay down, as Mr. Sharpe has done, a normal plan. Though slight variations of size and detail may be found, a departure from the normal Cistercian type is never seen. So that, given a cloister-quadrangle, or a church, however mutilated, we can dispose or imagine the whole of the surrounding buildings which composed a Cistercian monastery of the twelfth century. This Mr. Sharpe has done upon a typical plan given in his work, which is the "concrete result," as he tells us, of the aggregate plans of the whole of the Cistercian abbeys that he knows. Taking these buildings in order, we have—1st, the Church as the most conspicuous of the group. "The rules in regard to it were formal and numerous." Their dedication to the "blessed Virgin" was one remarkable rule, while they all were built in form of the cross. The choir was short, seldom having more than two compartments beyond the crossing; it was usually square-ended and apseless, though, in later examples of the twelfth century, apsidal terminations made their appearance. The only English departures from the square end are Beaulieu and Croxden. Transepts have, Mr. Sharpe remarks, no aisles; we would notice the eastern aisle of Netley as one exception to this rule. Chapels existed in the eastern side of transepts often separated by walls, and many of the altar bases are to be found. Six of the nine altars in the eastern transept of Fountains Abbey have only lately been laid bare by Lord Ripon. A narthex at the west-end, roofed as a lean-to, is often seen, as at Fountains and Byland.

The singular absence of towers is remarkable, but they were expressly forbidden by the Chapter of 1134. Those at Fountains and Furness were added after the rules became relaxed at the close of the "Rectilinear" period. The walls of crossing were generally in England carried up through the roofs of the church, simply covered by a low pyramidal roof, with wooden belfry. This central lantern exists at Kirkstall. One remarkable fact deserves notice, and that is, that the Cistercians were iconoclasts in art; their wall surfaces, carved work, vestments, stained glass were perfectly plain, all devoid of superfluous carving; and a rigid prohibition of the human form was enjoined which deserves especial notice by ultra-Mediævalists of our own time. The reasons for the latter prohibition may be here given: "Cap. XX.—*De Sculpturis, et Picturis, et Cruce lignea.* Sculpturæ vel picturæ in ecclesiis nostris seu in officinis aliquibus monasterii nefant interdictum; quia dum talibus intenditur, utilitas bonæ meditationis vel disciplina religiosæ gravitatis sæpe negligitur; cruce tamen pietas, quæ sunt lignæ, habemus."

No heads or figures are accordingly found carved in stone, though in monasteries of other orders they are common. Only pictures of our Saviour were allowed, and Mr. Sharpe says he knows of no single exception to this rule during the first two centuries of this order. The abbots also enforced this rule on their visits by authority. Stained glass was only permitted in such abbey churches "as

had belonged to other orders," or which existed previously.

Mr. Sharpe calls attention to the early Cistercian use of the pointed arch, their arches of decoration remaining circular, as in doorways, windows, &c.

Let us accompany our author round the series of conventual buildings, which were usually placed on the south side of church, this being the first erected building. Tintern, and Fontfroide, in France, are exceptions where the north side was appropriated. Passing out of the door opening into the east walk of cloisters, and close to south transept (an invariable opening), we come first to the Sacristy (*Vestiarium*) on the south side of Transept, and opening thereto by a door. It was lighted by an east light, and vaulted. A cell or penitentiary often occupied the western end of this department. Its use, however, appears to be a contested point, some contending it was a dead-house. It was windowless and vaulted. The Chapter-house (*Capitulum*), an important apartment, and next to the Church in rank, is next in order. Its architecture is generally more elaborate than other buildings, and its axis generally was east and west. The most noticeable feature of this apartment was its division into compartments by clustered piers and cross vaults of elaborate design, and often of great beauty of detail, as the piers and ribs of groining; also the way in which it opened to the cloisters by a screen or arcade of three arches, the centre arch being the doorway. Mr. Sharpe says "none of these openings were closed" as windows or doors. We may be permitted to question this, seeing that in some cases a cill and rebates are found. The examples at Kirkstall, Fountains, and Netley may be cited as unique of their kind. The abbot's seat was in the centre of east wall, and abbots were buried in the Chapter-house. As regards the adjoining passage-like room, called the "Parlour" (*Locutorium*), with a door at each end, Mr. Sharpe accepts the usual meaning in absence of a better one, viz., that it was a place where monks were allowed to converse with relatives and friends. We know the injunction of silence on all monks of this Order. A passage adjoining, leading from cloisters into precincts or garden on east side of building, is usually found. An interesting example occurs at Fountains. We come next to "The Fraternity," the last building on east of cloisters, its axis lying north and south, and often extending beyond adjoining buildings. It had a single row of pillars down the centre, with quadripartite vaulting without ribs, and was treated in the plainest manner. This was the living room of the monks. Another singular evidence pointed out is that it was unfurnished with a fireplace, and, in one or two cases, the south end was merely arched, not closed. At Furness the two southern compartments have arched openings in their north and south walls down to the ground, with no sign of enclosure. If this supposition be true, the hardy habits of the monks of the twelfth century is beyond question, for we find the same openings filled up with fireplaces by their successors of the fourteenth century. Jervaulx Abbey has its end of Fraternity similarly open to the air. A staircase intervenes on the west side of Fraternity between it and the next apartment—"The Kitchen"—which opens from south walk of cloisters. It was usually a simple vaulted chamber, the most noteworthy features being the large funnel-shaped fireplaces and chimneys corbelled out of wall. At Fountains there are two of great size, and sometimes fireplaces on all sides, as at Jervaulx. In the design of these fireplaces there is something to be learnt by modern architects. The fire openings were generally simple recesses in the thick wall, and the chimney was corbelled out at its entrance, and gathered back into wall as it rose. Netley has an unique example.

Similarly placed as regards its axis, and next to Chapter-house in finish, was the

\* "The Architecture of the Cistercians." By EDMUND SHARPE, M.A. London: F. & F. N. Spon.



Refectory (*Refectorium*). It occupied the centre part of the south walk. In other orders we find this apartment running with the walk, or east and west. A single row of pillars supporting a groined ceiling is sometimes seen, though, generally, a wooden roof. One or two features call for notice: the first, the usual recess at west end, provided with a pulpit of stone from which one of the monks read during the hour of refection. At Beaulieu, in Hampshire, we have a most beautiful carved corbelled pulpit of this sort. At Fountains, also, the stone locker for books exists. Another feature was the Servery or hatch-way, sometimes seen between the kitchen and refectory, a feature not noticed by Mr. Sharpe.

A Lavatory (*Lavatorium*), generally recessed in the south wall of cloister, and sometimes in a separate building opposite the Refectory doorway, is found in proximity to the latter. An apartment for stores and provisions or "offices" is usually found between the Refectory, and the west side of Cloisters.

The west side was usually occupied by an important building, which Mr. Sharpe designates as the "Domus Conversorum." Its lower story is considered to have been the day and workroom, and the upper story the Dormitory of the Convents. It was divided like the Fraternity and Refectory by a row of pillars, simply vaulted, and was, as a rule, the longest of the conventual buildings, sometimes 300ft. in length. Fountains Abbey has a fine example of great length (which we illustrate). Respecting this building, Mr. Sharpe enters at length in a second part of his work, and is led to give it the name here mentioned, instead of that originally assigned by him, viz., "Hospitium." The title "Domus Conversorum" frequently occurs in monastic records as one of the normal adjuncts of a Cistercian convent. Mr. Sharpe illustrates three examples of this building; as found at Fountains, Vauclair, France, and Furness Abbey. The great length of the apartment is remarkable, the average proportion being as seven or eight to one. That at Fountains Abbey, which we illustrate, is the largest known by Mr. Sharpe; it is 300ft. in length and 44ft. in breadth, with dormitory of same size over. It has sixteen compartments in length, and is vaulted with plain quadripartite vaulting. The details are remarkably simple and effective. The conversi, or converts, were a large body of workmen, labourers, and servants, and required, as Mr. Sharpe points out a large apartment, and ample dormitory. We know the Cistercian rules prescribed straw mattresses, and that the conversi slept in the same clothes they wore during the day. It will be noticed, that whereas the sacred buildings, the church and chapter-house, stood east and west, and were transversely divided into three parts, the dwelling-place of the monks, and that of the converts, had their axes north and south, and were divided longitudinally.

At Fountains, the windows and doorways of the northern half of day-room are circular headed, those in southern half, pointed; in the dormitory they are circular. The day-room and dormitory both had access to the church at its western end, and these stairs were often within the thickness of the wall.

We have no space to enter into the interesting minutiae which Mr. Sharpe places before us. The Library (*Scriptorium*) was the second story of the chapter-house, where the MSS. were written and illuminated by the most intellectually-inclined monks. The whole of the vaulted buildings between the fraternity and south transept of church had a second story, used as monks' dormitory, &c.; and a stair-flight leading into the church. This was, in the earlier buildings, a newel stair, and was constructed in the middle of the south wall of south transept. In some cases it appears to have been placed in the east angle of transept with choir. This stair gave access from the monks' dormitory to the church during

night time, in accordance with the nocturnal services.

The Abbot's Lodge is generally situated on the east side of the conventual buildings as a detached building (as at Netley) of two stories, the lower being the kitchen, the upper the living room; the former was vaulted. At Fountains the Abbot's Hall is a noble building, and formed, with the lodge and chapel, a group. Among the outlying buildings is the "Hospitium," or Guest-house.

The Cistercians seem to have had some knowledge of sanitary construction. Their water-supply was utilised in many ways. Traces of the Abbey Mill are often found, and we find covered conduits or passages brought to the kitchen offices of the convent, according as the valley stream was needed as a water power, as a fish stew, or otherwise. At Fountains it was utilised first for the mill, and afterwards it was divided and carried in different channels under the buildings by well-built arched tunnels passing under the hospitium, refectory, kitchens, &c. The same covered tunnels are seen at Netley.

We refer our readers to Mr. Sharpe's interesting book for further detail. His remarks and classification apply to the plan of a Cistercian monastery of the middle of the twelfth century, though various changes crept in during the latter part of that period. A development of choir took place, as in the aisled-choirs of Fountains, Rievaulx, Netley, and Tintern. In conclusion, we may quote Mr. Sharpe, thus: "For vigour and boldness of design, for excellence of proportion, and for simplicity, elegance, and purity of treatment," the Cistercian remains and school of architecture "were unsurpassed by buildings of any age or country; and a careful study of their excellences could not fail to exercise a beneficial effect on modern designs, by checking exuberance of ornamentation, and by the cultivation of a purer taste, delighting rather in form and outline than in colour and surface decoration." We heartily endorse these remarks, and commend them to all architects.

With the permission of Mr. Sharpe, we give a perspective view of the Domus Conversorum of Fountains Abbey, a very fine example already noticed; and a view of the one at Furness Abbey, whose site and remains have been lately laid open, and of which Mr. Sharpe has given us this ideal restoration. Though smaller, the details of piers and lateral responds which carry the vaulting are very interesting examples of Early and Middle Transitional work. It will be noticed that the larger arches are pointed, the smaller ones being circular, a fact we have already noticed. This building belongs to the middle of the period, circa 1160, and is probably a few years earlier than the other example. At Fountains there is a small apartment attached to the west wall of the day-room, which, according to Mr. Sharpe, contained a porch and a small vaulted room with a fireplace, and was probably the residence of the master of the conversi, over which the stairs to dormitory passed.

The discovery of this interesting and important building (the Conversorum) at Furness Abbey is due to the suggestion thrown out by Mr. Sharpe at a meeting of the Archaeological Association of 1850, that traces of such a building would be found below the field on the south side of the church. This idea has been verified, as our readers will see, to an extent that places the normal arrangement of a Cistercian monastery pretty much in the category of an exact science.

## THRUST OF ARCHES AND VAULTS.

### FIRST PAPER.

OUR readers have had their attention recently drawn to the subject of "Vaulting" by an essay read before the Institute of British Architects, of which an

abstract appeared in our columns. Having treated with much ability upon the various systems adopted by ancient builders in constructing vaulted roofs, the author of the essay proceeded to give a description of a mode of determining the stability of arches by a geometrical process, in which he finds the direction of the "line of pressure" of the forces acting on the arch, and thereby ascertains the necessary strength that must be given to the abutment in order that it may not be pushed over by the thrust of the arch. He, however, confined his attention entirely to the case of the surcharged arch, and does not attempt to solve the problem of finding the thrust of a vaulting rib which has no surcharge; in fact, the method he employs is quite unsuited to such a case, and is both laborious and uncertain in its application even to the loaded arch, as it requires great accuracy in forming the diagrams and considerable care in the calculations, a slight error in either of which may vitiate the results. As this is a subject of great importance to the architect, and one with which he cannot be too familiar, we propose to lay before our readers a brief epitome of the methods of investigating the thrust of arches, whether loaded or unloaded, adopted by the most recent writers on scientific building, avoiding, however, as much as possible, the use of mathematical formulæ, and endeavouring to bring the subject within the comprehension of all who have a moderate acquaintance with the most elementary principles of geometry and mechanics, so as to enable them to perform the calculations for themselves upon any particular case that may arise.

There can be but little doubt that arches were used at a very early period of the world's history, having been discovered in the vaulting of sewers both at Nineveh and at Rome; but it was not until a comparatively late period that they began to form architectural features in the public buildings. No doubt many experiments had been made in order to test the capabilities of the arch in carrying a wall over a wide opening, and the necessity for a good abutment discovered in order to prevent the arch from pulling down the building it was intended to support; but none of the ancient mechanicians appear to have attempted an investigation of the principles which were involved in the stability of an arch; and although arches of large span have formed the main features of buildings for the last 2,000 years, it is but recently that any means have been found of calculating with accuracy their thrust and the strength necessary to be given to the supporting piers or abutments. It is to this want of knowledge that we owe the lamentable condition of some of the finest buildings of the Middle Ages; the cathedral builders of the eleventh and twelfth centuries were evidently afraid of the arch, and used piers and abutments of enormous strength, as may be seen in the Norman work of Durham and other structures of the same period. As they advanced, however, in experience, they by degrees diminished the size of their supports, and at the same time increased the span of their arches, making the piers or columns of just sufficient strength to carry the dead load, and trusting to the arches themselves to counterbalance each others' thrust, the end piers being made stronger in order to form an abutment. The consequence of this arrangement has often been the thrusting out of the piers, especially where arches of different spans abutted, and their thrust has had to be counteracted by means of iron tierods, as may be seen in Westminster Abbey and other buildings of the same period. In the later buildings of the fourteenth and fifteenth centuries the principles on which the stability of arched structures depend appear to have been well understood, the thrust being carefully resisted by strong abutments and flying buttresses, as in King's College Chapel, at Cambridge, and Henry VII.'s Chapel at Westminster.

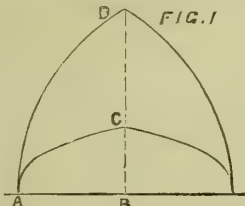


The one great principle to be kept in mind when arches of considerable span are used in a building is that they are always thrusting against the abutments in a horizontal direction, and tending to overturn the walls about their base. Hence it will be seen that the higher the springing of an arch is from the ground, the greater in that proportion will be the tendency to overturn its support, which acts as a lever, having the horizontal thrust at the top, and the fulcrum at the outer edge of its base. In order, therefore, that we may know what strength must be given to the abutment, we must find out what proportion of the load sustained by the arch resolves itself into a horizontal force, since all the rest of the load will act vertically and help to secure the stability of the structure. Much will depend also on the contour of the arch, and the relation which exists between the span and versed-sine, or height from springing to key; it being evident to anyone having the slightest knowledge of mechanics that the horizontal thrust of a flat arch, as the ellipse or Tudor arch, must be greater for an equal span than that of a lancet arch of high pitch. Comparing the two arches shown in Fig. 1, having the same span, it may be considered that approximately the thrust of each will be inversely as the height of the key from the springing line; or, the thrust of arch A C B : thrust of arch A B D

$$\therefore \frac{1}{BC} : \frac{1}{BD} \text{ or } :: BD : BC, \text{ nearly.}$$

The theory of the arch has been discussed in several different ways, the earlier writers treating it as a purely mathematical question without reference to practical experience; considering the arch as an assemblage of stone wedges, each of which was being driven inwards by the superincumbent load and its weight, the upper ones tending to force out the lower; in order to counteract which it would be necessary to increase the load indefinitely at the haunches. In this mode of treating the subject, which was called the "voussoir theory," no account was taken of the friction and cohesion between the surface of the voussoirs. Other writers looked upon the arch as an inverted funicular polygon or catenary, in which any variation of pressure would be fatal to the equilibrium. To the practical architect, however, these refined theories are of but little value, since in the arches he has to erect the pressures are often unequally distributed, and one part may be much more heavily loaded than another; so that the stable arch must be able to support unequal loads on its several parts, tending to produce rupture in one part more than in another, without showing the least sign of yielding or settlement in any of its joints.

Well-built arches of stone or brick, jointed in good mortar or cement, will seldom give way or open at the joints except by the yielding or pushing out of the abutments, which, if of sufficient strength or weight to resist the outward pressure, will be thrust out of perpendicular, and the arch will be at first distorted, and then will gradually fall to pieces as the outward movement of the supports continues. Arches which have been built long enough to allow of the cement or mortar becoming hardened, will, if overloaded, tend to break up into four parts, the manner of fracture depending somewhat on the form of the arch. If the arch is a flat one, the height not exceeding half the span, as in



the elliptical and semicircular forms, the fracture will be as shown in Fig. 2. When the abutments begin to incline outwards from the perpendicular the crown descends, and, consequently, the joint at the key C opens downwards; the haunches rise and open upwards at E and D. In an arch of high pitch, as Fig. 3, and where there is little or no surcharge, the pressure of the load at the haunches tends to open the joints E and D inwards, and to cause the joint C, at the key to open upwards, or the arch gives way by the falling-in of the portion at the haunches. Hence it will be evident that the result of the investigation will depend very much upon which mode of rupture we select. One reason why arches are often found in a crippled state, but not unstable, is that the maximum horizontal thrust is exerted before the abutments begin to yield, and as they are gradually forced out of the perpendicular, and the arch becomes distorted, the actual thrust diminishes, and the several parts adjust themselves by degrees to their altered positions; so that an arch with insufficient abutments may yet stand for centuries, although in a very altered form, as is often seen in old buildings; in fact, an arch will seldom give way all at once, unless very carelessly constructed, but will give timely notice of its weakness, and afford ample opportunity of preventing its fall.

In order to arrive at any correct results in our investigations of the thrust of any arch, we must first ascertain with tolerable accuracy the position of the joint at the haunches at which it will probably open, or at which the effect of the horizontal thrust at the crown will be greatest; but as this is a purely mathematical problem, and one involving the use of the integral calculus, we shall confine ourselves to stating the results which have been obtained by modern investigators.

The semicircular arch is usually taken as the standard form on account of its simplicity, and in this arch the "joint of rupture" makes an angle of 30° with the horizontal, so that if a perpendicular is dropped from its inmost edge next the intrados of the arch upon the springing line, the height of this joint above that line is exactly one-fourth of the span of the arch. The same investigation has been made with respect to arches of other forms, as the pointed or Gothic arch, and in all cases where the tangent to the curve at the springing is vertical, it is found that the height of the joint of rupture above the springing line is nearly the same as in the semicircle, so that for the pointed arch (Fig. 3) we may take A I equal to one-fourth of A B, E I being the joint of rupture.

We must, however, reserve for another article the consideration of the forces which act on the arch and tend to cause fracture, and also the means by which we can ascertain the amount of horizontal force acting at the joint of rupture, from which the necessary thickness and strength of the abutment can easily be found.

#### COLOUR.—II.

**R**ESUMING our observations on the juxtaposition of coloured surfaces and their contrasts, we have seen the effect of white in heightening the tone of colours to which it is contiguous. The principle of the intervention of white is an important one. We have seen that if blue and red come together, each becomes tinged with the complementary colour of the other; thus the red approaches orange, the blue approaches green. Now, the interposition of white, by extinguishing the white

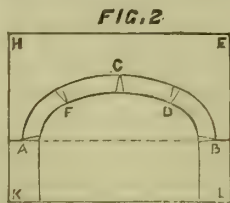
rays reflected by the coloured bodies, makes the colours more vivid and enhances their effect. It has been observed by the late Mr. Owen Jones that as one of the objects of decorating a building is to increase the effect of light and shade, the best means of employing blue, red, and yellow, is to place the blue as the retiring colour on the concave surfaces; yellow, which advances, on the convex; red, the colour of middle distance, on the horizontal planes; and the neutral white on the vertical planes. It has been succinctly laid down by Owen Jones, in his valuable Propositions on Colouring, "colours on white grounds appear darker, on black grounds lighter." Yet this simple truth appears to be unheeded in the application of coloured decorations and surfaces to our churches.

Another law may be stated here, known as "Field's Law of Chromatic Equivalents." The primaries of equal intensities will harmonise or neutralise each other in the proportions of 3 yellow, 5 red, and 8 blue—or integrally as 16. The secondaries in the proportions of 8 orange, 13 purple, 11 green—integrally as 32. The tertiaries (compound of orange and green or citrine) 19; russet (orange and purple) 21; olive (green and purple) 24—integrally as 64. Each secondary being a compound of two primaries is neutralised by the remaining primary in the same proportions; thus, 8 of orange by 8 of blue; 11 of green by 5 of red, 13 of purple by 3 of yellow. Again, each tertiary being a binary compound of two secondaries, is neutralised by the remaining secondary—as 24 of olive by 8 of orange, &c. The colours are supposed in the above case to be used in their prismatic intensities.

Before proceeding to consider the harmony and contrast of colours, let us briefly refer to the juxtaposition of coloured surfaces with grey. Grey bodies in contiguity to coloured bodies exhibit a far better contrast of colour than either white or black. Taking red and grey; grey appears greenish by being influenced by the complementary of red; red appears purer. Taking blue and grey; grey inclines to orange by influence of the complementary of blue, and the blue appears more brilliant. If, however, instead of a normal grey (i.e., one compounded of a mixture of pure black and white), we juxtapose a grey tinted with red, blue, &c., these tints will be heightened by the complementaries added to them. Thus, a bluish-grey receives a perceptible increase of blue from proximity to orange. All primary colours gain purity and brilliancy by association with grey. Chevreul says, "Although grey never produces a bad effect in its association with two luminous colours, yet in most cases its assortments are dull, and it is inferior to black and white." In combining with sombre colours, as blue and violet, and with broken tones of luminous colours, grey produces harmonies of analogy, and it has the advantage of separating them from each other. When associated with two colours, one luminous and the other sombre, it is often more advantageous, and less contrastive than white, also more so than black.

In separating colours either by white, black, or grey, for the purpose of heightening their contrast or improving their joint effect, it is necessary to take into consideration: 1. The height or tone of the colours. 2. The proportion of sombre to bright colours. Whenever colours differ much in tone or brilliancy from black or white with which they are to be associated, it is best to separate each from the other, instead of the separation by pairs. Thus, white, blue, white, violet, white, &c., is better than white, blue, violet, white, &c., the separation in the first case is more equal between the brilliant and sombre colours.

Strongly opposed colours are easier of assortment than those which are nearly alike; and an artist who can select two colours has to decide often whether he should increase the effect of contrast or that of analogy. Frequently, however, it is preferable, as Chevreul





remarks, to adopt the latter, or incline towards the harmony of scale or of hue. Thus it is a nice point for the artist to decide whether adjacent colours should have harmony of contrast or harmony of analogy, and to interpose accordingly either white, black, or grey.

Having spoken of the effects of harmony and contrast of colours when they are separated by white, black, or grey, let us inquire into some of the effects of colours without such intervention. It must be premised that the primary colours of the painter are not the colours of the prismatic spectrum, but those employed by him as red, yellow, and blue. There is no substance or matter known that gives pure colour or that reflects only one kind of colour rays, as pure red, yellow, or blue. Chevreul observes, "The primaries, red, yellow, and blue, associated in pairs, assort better together as a harmony of contrast than an arrangement of one of these primaries and a binary colour in juxtaposition with it, having the same primary as one of its elements. For instance :

Red and yellow accord better than red and orange.

Red and blue " " red and violet.

Yellow and red " " yellow and orange.

Yellow and blue " " yellow and green.

Blue and red " " blue and violet.

Blue and yellow " " blue and green."

Again, the arrangement of red, yellow, or blue with a binary which contains the former, presents a better contrast when the simple colour is more luminous. It is an advantage also for the red, yellow, or blue to be of lower tone than the binary. For example, red and violet agree better than blue and violet; yellow and orange agree better than red and orange, and yellow and green better than blue and green. We have already seen that when two colours do not agree together, it is preferable to separate them singly by white or black—the latter is better when the colours are luminous or brilliant ones. The same principle of contrast is stated more concisely by Owen Jones in one of his propositions, namely, "When a primary tinged with another primary is contrasted with a secondary, the latter must have a hue of the third primary." This principle is a simple one, but it is nevertheless flagrantly violated in the art of decoration. As we have observed, however, it is necessary for the artist to consider the nature of the contrast he desires to produce, or if one of *contrast or analogy*; if the latter, it will be by inclining towards harmony of scale.

Another principle is stated by Owen Jones. "When a full colour is contrasted with another of a lower tone, the volume of the latter must be proportionally increased." The simultaneous view of the series of tones of the same scale gives an agreeable sensation if the tones have equal and sufficiently numerous intervals. Another harmony results when we view different colours of distant scales, as that of complementary colours or of binary assemblages, which, without being complementary, are yet very different.

Summing up the harmonies of colour, we have those belonging to harmonies of Analogy, as (1) those produced by the simultaneous view of different tones of the same scale; (2) harmony of hues, produced by a view of tones of the same or approximate depth belonging to neighbouring scales. Of harmonies of Contrast we have (1) those of contrast of scale or the effect of two distinct tones of the same scale; (2) harmony of contrast of hues produced by tones of different depths belonging to neighbouring scales; (3) harmony of contrast of colours produced by colours of very distant scales, assorted according to law of contrast.

In harmony of contrast the complementary arrangement is best, and the tones should be of the same depth. Owen Jones observes: "The various colours should be so blended that the objects coloured, when viewed at a distance, should present a neutralised bloom." Again, "No composition can be perfect in

which any one of the three primary colours is wanting, either in its natural state or in combination." In accordance with these views, and the neutralising effect of combining the primary colours, the late Owen Jones asserted that "the nearer we can arrive at this stage of neutrality the more harmonious and light-giving will a building become." He also showed that the most perfect specimens of colouring of the ancients—as that found at Nineveh, Egypt, and Greece, and in the East by the Moors—show this combination of colour; also, that there was as much blue as the yellow and red together, or the proportions were as 8, 3, and 5. By this balance the light and shade were thus agreeably blended. The secondaries appear to have been used sparingly at first, but subsequently they invaded the dominion of the primaries, and blue and red gave place to green and purple. In Pompeii the secondaries and tertiaries are the ruling harmonies. The works of the Middle Ages show a similar use of primaries in the earlier stained glass and MSS., though, as time wore on, greater varieties of tint and shade prevailed. There can be no doubt, however, that it is to the secondaries and tertiaries we must look for a system of colouring which shall satisfy the taste of the age, the primaries being sparingly introduced to emphasise merely.

#### NOTES ON HOSPITAL CONSTRUCTION.—I.

HOSPITALS are a kind of structure with which the architect is little familiar; and when he is called upon to compete for or design such buildings, he is often thrown upon his own resources, or obliged to make a tour of inspection; in fact, his materials are either too uncertain or unmethodical to be of much service. The subject, however, is less barren than formerly; we have some good models. In a series of articles just concluded in the *Lancet*,\* we are placed in possession of some useful data relating to the principles of Hospital Construction. We will here lay before our readers the gist of these remarks, commenting upon them as we proceed.

And, first, let us take the general arrangement of such buildings, or the massing and grouping most conducive to the desired results. In designing structures of this class, the architect is first obliged to lay down his general outline or block plan, at least roughly, before he can proceed, though such a course presumes a knowledge of what a ground plan should be, and which we shall notice in our next article. Fortunately for the architect, there is not much to master but the details of one ward, after which it is a matter of combination. One of the chief, if not the most important of the principles he has to consider in designing this class of building is the relative advantages of one-floor hospitals, and those on the "pavilion principle," which adopts more than one floor of wards. There are certain advantages in both arrangements. The one-floor ward plan is sanitariously more perfect than any other, and we are told on good authority that single detached wards would be the best plan. Such an arrangement, however, necessarily limits the number of beds, and, moreover, would be expensive and impracticable in towns. But what are the advantages claimed for single-ward plans? First, they are not open to the objection of being contaminated by rising currents of foul air, as in the case of superimposed wards; second, they afford easier means of communication by avoiding stairs and the necessary fatigue entailed by mounting and descending them; third, the ward offices may be made more efficient as well as more economical; fourth, they admit of easier and less costly administration.

Against these advantages we have larger

area of ground covered, and therefore greater first cost. We may say, also, one-ward plans, though theoretically the best, are practically out of the question in thickly-populated towns, and must therefore give place to the "pavilion" principle on economical grounds. The question at once arises, How many floors of wards are allowable with due deference to sanitary conditions and economical administration? This is rather a knotty point. If we admit the pavilion principle, it surely can make little difference whether we have only two or three or four stories, yet the medical profession seems to be unanimous in their opinion that more than two floors of wards involves a serious doubt. The Herbert and St. Thomas's Hospitals are before us to decide this point.

Another, and the next most important principle to decide before the architect can design his building as a whole, is the manner in which the pavilions or blocks are to be arranged on the site. Of course the ground will determine this in a great measure, though there are many cases in which the architect is left to choose for himself the most desirable and effective disposition of the blocks. There are several examples to guide us on this point. The Lariboisière Hospital, in Paris, and our own St. Thomas's have single, while some others have double pavilions. These may be placed endwise if the land is narrow. The block plan would in this case form one long line of wards; or they may be disposed transversely to the communicating corridor, the blocks or pavilions being ranged parallel to each other, as at St. Thomas's. This arrangement is, perhaps, the most desirable, and is one which admits of any grouping. For instance, these parallel wards may be disposed in a quadrangular form, enclosing a central courtyard; in a single row, as St. Thomas's; or better still, in the shape of the letter H, or  $\Pi$ , or  $\perp$ . The Herbert Hospital, at Woolwich, which is a good example of a two-floor pavilion, has an arrangement of double wards, or, that is, a series of parallel blocks, placed end to end in pairs, joined by a central corridor, these blocks, or pavilions, being separated by an interval of about twice their height. Wards should be so placed, as regards aspect, that both sides of them should have the sun. It is best, therefore, that the axes of the wards should be north and south, or as nearly so as possible; in some cases, where keen winds prevail, a north-easterly and south-westerly direction for the ends would be better. Through ventilation and sunlight are now acknowledged essentials to health, while they have materially simplified the work of the architect. The problem of hospital arrangement is thus resolved into one of hygiene and facility of administration.

#### HISTORIC ART STUDIES.

##### ITALIAN SCULPTURE OF THE SIXTEENTH CENTURY.

(With Double-page Illustration.)

THE stone, that became flesh during the fifteenth century in Italy, was endowed with glowing vitality and ideal beauty during the sixteenth century. It is of no use to detach art forms from the period in which they grew; and in spite of all that scientifically untrained working builders may say, the intellectual atmosphere and the religious character of the times are clearly reflected in the products of art. Neither caprice nor artificially-engendered whims regulate art and bring forth a Benvenuto Cellini, or a Michael Angelo. The harmony of forms and colours takes its root above all in the harmony of ideas. Works of art have their imperceptible element in the intellect and imagination of the artists, who have to learn to master life and its destiny in order to embellish it with beauteous forms. To grasp with greater ease the historical development of art, it is well to generalise as much as possible the three great phases of

\* "Principles of Hospital Construction." By JOHN SUTHERLAND, M.D., and Captain DOUGLAS GALTON, C.B., F.R.S.



art-progress. We have 1, *Orientalism*, consisting in a struggle to become master of matter. This Orientalism rules supreme wherever the culture of the mind is low, and the forms bend under symbolism or dogmatism. 2, *Hellenism*, which freed men from the inordinate supremacy of matter, and brought a harmonious balance into spirit and matter. 3, *Teutonic Christianity*, which emancipated man's subjective spirit, gave him the gospel of freedom, and taught him to be conscious of his artistic creation. The Orientals strove to be irregular and picturesque, the Greeks were well regulated and plastic, and the Teuton Christians became self-conscious masters of matter, and blended the pictorial and plastic into one. The art products of the Middle Ages were essentially Oriental; the analogous forms were but the products of an analogous mode of thinking and feeling with the Indians, Egyptians, and Assyrians. Art hated everything beautiful, symmetry was held in abhorrence, and beauty considered sinful. During the Middle Ages, however, an intense feeling of pious credulity, of ecstasy and humility, of frivolous recklessness and enthusiastic readiness to renounce for an idea all bonds of nature and society, was fostered. These feelings formed the transition links to the bright period of the Renaissance. Hurling down from the plastic heaven of Greek beauty, Art found itself in the gloomy Hades, where mere shadows were reflected in the dim twilight of superstition and fanaticism. The Greeks succeeded in humanising their gods, and the Teutonic Christians in deifying humanity by bringing out the divine spark of God's Spirit with which each human being has been endowed. This could only be accomplished by a careful study of the Antique, which, intellectually and artistically, forms the very basis of our culture. For more than 2,000 years Art struggled to find corresponding forms for the changed religious thoughts and the altered customs and manners of the Europeans. No success was attained. At last the typical conceptions in theology and learning gave way. Lord Bacon opened the book of nature, and told us to study her laws by induction; Luther freed humanity from the fetters of Hebrew-Egyptian obscurantism; even the Romish Church was dragged into the whirling vortex of progress. This spiritual reform of the North was to be checked by a brilliant reform in arts. What the North worked out in ideas, the South accomplished in forms. Dogmatism was to be discarded everywhere. The heavy thinkers in the North had felt its fetters in Science; the sculptors and painters in the South felt themselves suddenly freed from conventionalism, and they began to paint with an overflowing heart—*beauty*; whilst the North strove to proclaim—*truth*. Dogmatism checked the progress of Hindoo, Egyptian, Assyrian, Muhomedan, and Ecclesiastical art. The dogma, with its personifications, must become stationary, or it leads, as with the Muhomedans, to a peculiar one-sided groove. Dogmatism leads to hatred and the petrification of our better nature, smothering it through dead forms. Dogmatism despises dogmatism; reviles, abuses, persecutes, and banishes dogmatism. Dogmatism tore the flesh from the bones of those who did not agree with it, and sent the body to be burned at the stake to save the soul. Incense was used to sweeten the polluted air, poisoned with the burning of human sacrifices; and numberless candles were used to brighten the dark nights of dogmatic madness. The action was terrible, but produced the most salutary reaction in arts and sciences. Love and truth appeared on the wings of Classic revival, and permeated with new vigour the creative powers of man. Christ, according to the fashion of the Middle Ages, has been represented with the whole weight of the swollen body hanging down, the knees relaxed, bent outwards, the head drooping, and the distorted features of the face showing an involuntary struggle with the

pains of death; now the Redeemer was generally sculptured or painted with an erect body, the head turned upwards, expressing more the sublime idea of victory, or the mournfully joyful sentiment of the one blissful sigh, "It is finished." Art was no more to be the servant of a priestcraft for dogmatic purposes, but had regained its own free dominion of truth and love. We referred already to Florence as the seat of learning and art, a second Athens, during the sixteenth century. Under the porches of temples in Greece, philosophers and artists assembled to discuss the very highest principles of ethics and beauty; in the reception-rooms of Popes and Cardinals, of princes, nobles, and rich merchants in Italy, art and beauty were fostered, and more completely as dogmatic discussions were banished from these joyous spheres, in which everything was consecrated to the outward beauty of form. To captivate the spirit, to enslave our reasoning faculty once more the Church of Rome took the lead in art, whilst it tried to extirpate the rebellious movement in sciences and theology. The church thought little that an emancipation from gloomy symbolism in art and a revival of Classic forms was as dangerous as the discussion of the "Real Presence," "the Immaculate Conception of the Virgin Mary," and the "power of the Church to bind or to free souls from purgatory." Slowly, step by step, Italian literature and art led humanity back to a deeper study of the Antique. Apollo, in the Belvedere of the Vatican, became the leader of the resuscitated Muses. The study of the Antique was not so much directed towards an imitation of correct outward forms as rather to a quiet, simple, and well balanced expression of the most essential in form, position, and drapery. We may see the results of such a study in comparing the Gothic Saints of France, Italy, Germany, and England with the bronze statue of the Apostle and Evangelist S. John, by Baccio da Montelupo (see Fig. 1). Grace and dignity, truthfulness, and ideal repose show this master's accurate study of the Antique. The Statue was made for one of the Guilds, who often honoured sculptors with similar orders for works to embellish their halls. Christian conceptions are visibly wedded to Classic forms. That there is nothing incongruous in this union may be seen in the works of Michael Angelo. Sublime, unfettered, independent, free, and thoroughly original was the genius of this master. We give five sketches of his immortal sculptures (see Figs. 2, 3, 4, 5, and 6). Vain indeed to imagine art incapable of progressive development. Who would have believed that after a Phidias and a Praxiteles there should be another sculptor able to animate the cold marble with glowing life, and yet be perfectly original? How the Antique may be used in all its perfection may be seen in the colossal statue of David (see Fig. 2). The marble block, 33ft. in height, was transformed by the mighty creative genius of Michael Angelo in the short interval of eighteen months into one of the most interesting heroes of Biblical lore. Manly form and beauty are combined in the youthful body. The eyes are fixed on the adversary, the left hand lifts the stone, and the right rests ready for action. Motion and repose are combined and well balanced. A depth of feeling, an intensity of delicacy, is expressed through the whole form of the statue, which was placed in front of the Palazzo Vecchio, at Florence, in 1504. The most celebrated masters of this period—Andrea della Robbia, Cosimo Roselli, Simone Cronaca, Filippino Lippi, Sandro Boticelli, Giuliano and Antonio de San Gallo, Andrea Sansovino, Pietro Perugino, and Leonardo da Vinci—formed a committee to direct its erection. A splendid festivity was given by the citizens to honour the artist for this creation. The position reminds us of the Orator (in the Louvre), especially the head, which is undoubtedly less perfect than the other parts of the body. We

possess an excellent cast of the statue in the South Kensington Museum, presented by the late Duke of Tuscany. The Virgin Mary with the Child (see Fig. 3) unhappily remained a fragment. Here the head of the Virgin is worked with indescribable loveliness. Sorrow and rapture are mingled in the mother's features, and the child, eager to embrace the life-giving mother, is most softly and delicately treated. From an æsthetical point of view the statue may be objected to; for the realistic tendency in the composition mars the effect. Finished in composition, and also in all its details, is the marble group known as the *Pietà*—the Virgin Mary with the dead body of Christ (see Fig. 4). Leonardo da Vinci's "Last Supper," as a picture, and this group of the bereaved mother with her Son, are the greatest products of the Cinque Cento style. Unfettered by any conventional dogmatism, freed from all myths or traditions, Michael Angelo conceived this group in his own inner consciousness. He freed sculpture from all bonds, and still is perfectly Classic in his treatment. This group is the powerful reflex of a gigantic soul capable of grasping the anguish of a mother losing her son, the loving "God-man." The silent dignity and beautiful repose of the Antique is united in this group with the deep, sentimental, and passionate feeling of the Romantic school. Grief and anguish in the mother, satisfaction and eternal rest in the son, form a total of beauty and sublime grandeur. The group appears to express in marble the following line of Dante—

"Non vi si pensa quanto sangue costa."

The work has a double meaning, as have many of Angelo's works. They are mighty protests against the past, foreshadowing a brighter future. Blood was no more to be sacrificed for unintelligible metaphysical theses; man was to regain in arts and sciences his eternal birthright of freedom. In his Moses (see Fig. 5) the Titanic genius of Michael Angelo reached its climax. This is the petrification of the spirit and tendencies of the sixteenth century. Law was to be the ruler of the future. The statue was destined for the tomb of Pope Julius II., but the tomb itself was never finished. Moses and St. Paul were to adorn it. The Hebrew law-giver is represented as the living concentration of determined will; the mighty body represses with difficulty its rising wrath, the half-turned face flashes anger on those who have discarded God's commands. The left arm rests on the tables of the Law, whilst the right hand grasps the flowing beard to control the deep emotion; the left foot is drawn back and shows the readiness of the mighty prophet to rise and pour forth his unbridled annihilating anger on the violators of his laws. The old ideas of simplicity were to alter the degenerated and sunken state of the Romish Church; for Michael Angelo, though the Pope's artist, was as great a rebel in art as Luther in theology, or Shakespeare in poetry. The South Kensington Museum possesses an excellent cast of this masterpiece.

Goethe, when at Rome, wrote the following lines of Michael Angelo, "I am so entirely partial to him, that even nature displeases me after him, as I cannot look upon it with such mighty eyes as he. The inner power and manliness of this master, and his grandeur, surpass all expression. I cannot tell you how much I wished you to be with me, and to see what a single and thorough man could do and execute; without having seen the Sistine chapel, we can form no notion of what a man is capable of. We hear and read of many grand and excellent people, but here we have one quite alive, above our heads and before our eyes." Next in grandeur are the tombs of Lorenzo (see Fig. 6) and Giuliano Medici, in the chapel of St. Lorenzo at Florence. The composition of both the tombs in general conception is analogous. Lorenzo sits in a meditating position, and therefore called "Il Pensiero," whilst Giuliano holds the com-



maunder's staff in his right hand, and gazes into vacancy with self-possessed dignity. Dawn and Morning (Aurora) adorn the tomb of Lorenzo, whilst Night and Day are represented on that of Giuliano. The allegories speak for themselves as unsurpassed in conception and execution. For the male figures Michael Angelo is said to have studied the torso of Hercules in the Belvedere; but he only used the spirit which he cast into entirely new forms. "The universe broke into reality with mighty force," says Goethe, and characterised by these words the creative genius of Michael Angelo was able to fathom in his works the moving spirit of creation, to bring it into form, and to give life to everything he called into existence. Baccio Bandinelli ought to be studied with great care, in order to convince us what mean and insignificant works a mere spiritless imitator is capable of producing. With a heart filled with envy and ambition, he wished to outdo the Classics and Michael Angelo. He was grand in little technicalities, and wished to surpass his master. A male and a female Hermes (see Figs. 7 and 8) were chiselled by him, and placed before the Palace of the Florentine Republic. The antique form was changed; the figures not placed on a stylobate, but the male figure growing out of an oak, whilst the female rose from a laurel tree. There is an affected sensationalism in his composition which is even more objectionable in the relief (see Fig. 9), from the octagonal marble balustrade of the Church of St. Maria de Fiori, at Florence. The statue, in spite of its excellent technical execution, is one of those "tricks" which a real artist ought to avoid. The Piazza at Florence was adorned by the same sculptor, with a Herkules and Kakus. The forms in their vigorous and flowing lines are to a certain degree in Michael Angelo's style, but the whole is a dry and soulless composition, in which the muscular is to supersede the intellectual element. The medal by Niccolò Cavallerino (see Fig. 11), and that by Federigo Bonzagna (see Fig. 12), the first in honour of Charles V. and the second in honour of Pope Pius III., show that the influence of the Antique may be traced even in the products of glyptic.

G. G. ZERFFI.

(To be concluded in our next.)

#### THE USE OF TIMBER IN CONNECTION WITH MECHANICAL WORK.

MR. J. G. LYNDE, C.E., Borough Surveyor, Manchester, during the course of his recent presidential address to the members of the Manchester Scientific and Mechanical Society, dwelt at some length on the use of timber in connection with mechanical work, both with regard to pattern making and in relation to the erection and removal of heavy machinery. The proper relation and use of timber, he observed, was a matter in which they were all more or less interested, and if they would permit him, he would offer a few observations on the subject based on his own experience. For all ordinary purposes the kind of timber most used for pattern making and in temporary structures, such as travelling cranes, staging, framework, platforms, for the erection of bridges and similar work, was either American or Baltic, the nature and properties of the different descriptions of which are usually met with in our market he proposed shortly to describe; but before doing so, it might be interesting if he gave a very slight sketch of its introduction to this country. Previous to the colonisation of America our supply of fir timber was obtained from the countries on the coasts of the Baltic, of which Norway, Russia, and Sweden were the first resorted to. The colonisation of America, however, soon opened a large and valuable field for obtaining timber of similar growth, the two Canadas especially yielding large supplies of a very fine quality. More recently a supply of the same kind of timber had been obtained from Savannah and the adjacent States of America, and efforts were now being made to open a trade in California, where was to be found some of the finest red wood ever brought into our market. Fir timber might be divided into three distinct classes, known by

the colour of their wood, viz., white, yellow, and red. American spruce deal belonged to the first-named class, and was principally used for joists and bearing timber in common houses, as well as for scaffolding in the erection of machinery. There was so much of a very inferior quality of this kind of timber, and it was necessary a very practical knowledge of it should be acquired by those under whose directions it was used, as serious accidents frequently happened when it was misapplied; Baltic white deals were wood of a very fine texture, used principally for the same purposes as the American spruce deals. This timber would not, as a rule, bear so great a load as the American, but it was much less liable to warp from change of temperature. Both these kinds of timber were especially liable to decay if placed in warm or moist situations, fungi speedily forming on them, and causing what was commonly known as dry-rot, and when once this had commenced the wood was no longer to be depended upon. These woods were both extensively used for packing cases for machinery, and for this purpose were quite as good as more expensive timber. The next class of timber to which he would direct their attention was the American yellow pine. This timber was imported in logs, and cut up into boards or scantlings in this country. Like the white wood, this timber was practically not resinous; it was of a fair texture, and when not exposed to damp was durable. It was much used for building purposes, especially for joiners' work, and was covered with paint. As a bearing timber it had a peculiar quality, viz., that it retained its form with a permanent load, whereas many kinds of timber when loaded continue to deflect for years, although the load might not be greater than they might safely be required to bear. Unless, however, this wood was properly treated from the log, its valuable quality of retaining its form was materially impaired. The log should be opened and cut into boards in the autumn, and exposed to the weather through the winter; in the spring it should be removed into the drying shed, and thence into a room having a corresponding temperature with that wherein it was to be stored when finished, for at least one month before being worked. On no account should this wood be placed in a store, as in its removal from a high temperature it would always be liable to change its form. There were many qualities of yellow pine, and their quality varied very considerably. Next referring to the red wood, he said this timber was imported both from America and the Baltic in the form of both logs and deals. There were several varieties of red deals, each possessing its own peculiar character, but all of them more or less valuable on account of their power to resist atmospheric changes and the action of moisture. It was, therefore, much used in engineering works, for piles and timber framing exposed to the weather, railway sleepers, and all places where it was necessarily shut out from a free passage of air. It was also less liable than any other kind to dry rot. The timber imported from Sweden was generally of a very inferior quality, and of small size; it was very liable to crack if exposed to the sun, causing what were known as sun strokes. The custom at all the ports on the arrival of the timber was to put the logs into water to prevent this. The pitch pine imported from the Southern States of North America, Savannah, and Pennsylvania, was of a strongly resinous character, but had a great tendency to dry-rot, especially if it was placed in contact with fresh mortar and lime. This timber was, therefore, unfit to be built into walls as bearing beams, unless the ends were placed in cast-iron boxes, or were otherwise protected so as to allow a free circulation of air round the ends of the beams. Many samples of this timber had a beautifully waved grain, and would take a high polish; and these were selected and used for ornamental joiners' work. One peculiarity in connection with all red wood was the varied qualities found in the same log; the lower part of a tree might be exceedingly good, while the upper part might be very inferior. From the remarks he had made it would be seen how impossible it was to fix any arbitrary formula that would be applicable for calculating its strength; the quality being so variable, the same formula would not apply in any two cases. He had tried some experiments on a sufficiently large scale to guide his own judgment, and he found that for a very good and selected sample of Baltic timber the following simple formula for beams might be relied upon:—The breaking weight in tons on the centre equalled the product of the breadth with the

square of the depth multiplied by .15 and divided by the length in feet, and for an ordinary sample of timber he usually took the safe load in the centre in tons equal to the product of the breadth, with the square of the depth multiplied by .03 and divided by the length in feet.

#### WANTED—A NEW INSURANCE COMPANY.

BY SOLOMON SET-SQUARE.

WITHOUT any special sympathy with trade strikes, we may inquire what has become, since the recent Conference of Architects, of the associated builders' movement in favour of the binding-up with their contract agreements of the quantities on which their tenders have been based? We do not like at any time the cry of "Peace, peace," when there is no peace; and cannot shut our eyes to the stern fact that, albeit architects have decided the quantities shall not be bound up with, and form part of, the contract, builders have been as yet no parties to this formidable *Non possumus*. Something must be done to heal the open gash of discontent at the existing condition of things; and the question arises, What shall it be?

There are several ways in which a man may build; and somehow, though all of them may be furnished with the "silver lining" of the poet, there is a black cloud, or array of black clouds, wherewith every one of them is beset. A man may (we are speaking of the uninitiated capitalist) employ an expert *factotum*, or foreman, buy his own building materials, and employ his own building artificers, to work with or without the occasional supervision of an architect—or, he may, by a competition of ratio prices per foot, per square, &c., settle on a builder who shall be paid during progress, and at completion of his work, according to an agreed schedule of prices. Again he may, by waiting a few weeks or months, as the case may be, while the requisite drawings, specifications, and bills of quantities are prepared, enter into a hard and fast contract with a builder for an agreed lump-sum, determinable by the latter's attaching his ratio prices to a blank estimate, drawn up by one or more surveyors, by his employer's architect, or, by himself. This last mentioned lump-contract system has within the last forty years become so general that we may safely confine ourselves to its sole consideration. Regarded in the abstract, it would seem eminently simple and satisfactory; whereas, as we all know to our cost, it is the source of endless heartburnings and bickerings. "All I want," quoth the capitalist, "is to know precisely how much I shall have to pay for a given building when completed; it matters nothing to me how the gross amount agreed on has been arrived at: short of setting a crowd of builders to 'cut one another's throats' ere the initiating of building operations. I disclaim all interference with a contractor's profits; and I have no concern whatever with any of his losses, whether by under-pricing, miscalculation of moneys on his part, or, of quantities on the part of anyone else. I look to my architect to see that everything is carried out to the full terms of the drawings and specification." This, we say, is the capitalist's view of the matter, a view quite refreshing in its simplicity, and singularly *naïve* in its verdant confidence in the triune infallibility of the contractor, the surveyor, and the architect, all of whose energies have been taxed for the due ascertainment of that lump-sum sterling, on which all parties, *ab initio*, have agreed.

Well; and if a whole array of semi-practicable contingencies have been secured—that is to say, if the architect's documents (usually hurried in their preparation) are absolutely perfect, if the calculations of the surveyor (still more hurried) are the same, and the builder has accurately made up his tender; if, moreover, neither the capitalist nor his architect will dream all through the one, two, or more years occupied in its realisation of the very smallest alteration of the design, by whatever unforeseen incident or by whomsoever suggested; if, we say, all these utterly unlikely conditions shall have been secured, then indeed shall halcyon, rather than hard, lines be the respective lot of that capitalist, that architect, surveyor and contractor, and the world shall confess how simple and how satisfactory to all parties is the lump system of contract.

But does the picture we have drawn bear the



most distant resemblance to the actual working of a lump building contract? We all know it does nothing of the sort. Men (anyway architects, capitalists, surveyors, and builders) are anything but infallible. Architects are eminently fidgety and diffident, and clients very rarely know their own minds. Contractors very naturally demur to the want of elasticity of the lump contract system. A builder will not hesitate to be bound by a fixed ratio price per foot, rod, cwt. &c., for his work; but he wishes to shun all responsibility for the number of feet, rods, or cwt. that may be needed for the construction of a given building, with whose design he has had nothing to do, and whose ultimate shape, size, and character he knows by experience no seer or sybil can predicate. He is quite willing to supply certain quantities of material and to perform certain quantities of work; but their accuracy of enumeration, or sufficiency of description in a drawing or a bill of quantities handed to him is the capitalist's concern, not his. He refuses point-blank to compute or—what is the same thing—to examine into the accuracy of computation of a given bill of quantities: it is enough for him, he contends, to inspect the plans, visit the site, institute all the necessary inquiries as to the cost of freight, supply of water, sand, and the like, and after all to price out, money, and make up a long bill of quantities; and what reasonable man will say "Nay" to all this?

Our fathers were content to build with a schedule of prices, and to have their buildings measured up when all was over. There is no chance of return to such a system; nor is the fact to be in the least regretted; but we conceive every reasonable man acquainted with the subject will admit that the existing lump-contract system is flagrantly unphilosophical, if not absolutely immoral in its tendency. That it tends to daily degrade our architects and building contractors is undeniable. The wonder is that architects do not perceive this as a body, and make an effort to extricate the building trade, and with it their art, from the disastrous tangle into which the system has involved them. It is the direct interest of every architect (we speak not of the consequent extension of his percentage) to have the work he supervises well done and honestly paid for; but, in the vortex of competition, how few architects do anything to bring on such a consummation!

We disclaimed just now any special sympathy with strikes; but in view of the very grave evils to art, to the building trade, and to the general public, inseparable from the existing system of contracting, we wonder builders do not turn their attention to the Glasgow method of tentative estimating described by Scotch correspondents in past numbers of the BUILDING NEWS. It is averred that public bodies and private capitalists would refuse to fall in with it; but how so, if the building trade were to accept it, and inaugurate, after the manner of their artificers, a refusal of their own?

Failing some such measure of relief from the present unelastic system, it is obvious that, sooner or later, a novel insurance company will be needed. We shall hear not only of architects and surveyors guaranteeing the accuracy of their quantities, but of builders defining what shall constitute the guarantee—a clumsy expedient, truly, seeing that an error in quantities is, or ought to be, easily remediable. We often hear of surveyors guaranteeing their quantities; and we hear, too, of architects who may have issued these documents without any guarantee of their accuracy, professing to guarantee them on the payment of an extra fee. In what, we should like to know, does the guaranty consist? Now and then we hear of astounding errors in quantities—such as the entire omission of the wing of a workhouse, or the sides of a series of vast roofs, which the hapless surveyor's clerk may have omitted to "twice." How many surveyors have we who, when errors of such magnitude occur, are wealthy enough to reimburse the contractor for his loss? Very few; for neither architects nor surveyors are an over-paid class. So, if the lump contract system is to be perpetuated, and no one will consent to the London builders' device of binding up the quantities with the contract, what is to be done? There will, peradventure, arise a Surveyors' Insurance Company, "Limited," who, on payment of an agreed per centage, will guarantee, or, enable the surveyor to guarantee, the quantities he issues. By the term "surveyor," we mean, of course, not only the building surveyor but the architect who supplies his contractors with quantities. And all

this heavy machinery is required for the backing up and sustaining of the existing popular system of lump contracts, with their assumed John Willet-like immobility.

We are old enough to remember the change from contracting by schedule prices to contracting in the gross, or lump sum, and great at the time was the grumbling and contention of the builders, not then by any means the potent phalanx they have grown into. It was long before the existing method of employing one surveyor, to be paid by the successful tenderer, became firmly established. Competing builders then were, like competing architects now, put to vast trouble and expense, whether they succeeded or not in their ventures. The recent demand for the binding up of the quantities with the contract specification is, we take it, the shadow that portends the coming event—an entire reform of the existing illogical system whose outcome, any one may discern, is neither beneficial to the public nor to the building community, amongst whom we must perforce include the architects and building surveyors.

#### THE ROYAL ARCHÆOLOGICAL INSTITUTE AT YORK.

AFTER breaking up at Ripon, on Tuesday week, a number of the members of the Royal Archæological Institute, in conjunction with the Yorkshire Archæological and Topographical Society, visited York on the following day, the principal object of the excursion being to visit the fortifications of the city, under the guidance of Mr. G. T. Clark, F.S.A. The company, who numbered altogether considerably over 200, at twelve o'clock were received in the Guildhall by the Lord Mayor and Corporation of the city. Lord Talbot de Malahide thanked the Corporation on behalf of the Royal Archæological Institute, and said that the meeting of the Institute at York in 1846 was the first at which he had been present. The Marquis of Ripon responded for the Yorkshire Society; and this concluding the business of the reception, the visitors at once proceeded to the theatre of the York Philosophical Society's Museum. Assembled here, Mr. Clark read a paper on "The Defences of York." Mr. Clark said that he supposed that no man of English race, and at all acquainted with the history of his country, could enter the city of York without feeling something of the respect for a glorious past of which all men were more or less conscious, and which, in the higher and nobler sort, acts as an incentive to greatness both in thought and deed. The history of the metropolis of the North began with the Roman occupation, but recent researches into the sepulchres around the city had discovered undoubted British burials below those of the English and the Roman; and these, he might say, had established the existence of an early British settlement. He believed this discovery to stand alone. No earthwork of distinctly British origin was found within or near the city, nor, indeed, save the "ancient river," was there near at hand any physical feature of the country bearing a decidedly British name. No part of the great earthworks by which the city was girt could be attributed to the Brigantes. Though not all of one date, they all evidently belonged to ages more advanced, and to a class of work very different from those found scattered along the crests of hills, and sometimes retaining even now their Celtic appellations. The actual site of York he considered worthy of the people who proposed to take and hold the country, and to maintain it under law and order. While the country around was open, and admitted of being intersected with roads in every direction, the city itself was protected on one part by a broad and deep river, and on another by a stream, which, though of less volume, traversed and saturated a tract of marshy and impracticable country. It was evidently to the confluence of these two streams—the Ouse and the Foss—that York owed its origin. The precise date of the Roman settlement on the Ouse was unknown. Agricola, who landed in Britain A.D. 78, and formally retired in A.D. 85, probably established a permanent camp at York, but of course such a post would be at first a mere slight earthwork. Of this camp nothing was to be distinguished. By whom the Roman walls were originally built was unknown—probably during the second campaign of Agricola, A.D. 79. Although little of the Roman wall remained above ground, yet it had been traced, and various other Roman remains had been discovered below the present surface, including, especially,

a pavement laid open just within Micklegate-bar. As to the existing earthworks, he was inclined to think that they were of at least two periods; those upon the right and left banks of the Ouse, and those beyond or on the Foss. The former consisted of a ridge or bank of earth from 15ft. to 40ft. high, and of breadth in proportion, which was carried round the area to be defended, and at its exterior foot was excavated a deep and broad ditch, the contents of which formed the bank. Of these earthworks there remain nearly 3,000 yards in length. It seemed to him that these earthworks had been the work of Romanised Britons, who, after the withdrawal of the Roman Legion, had much to defend. Judging from material evidence, the completion of the earthworks as now must be attributed to the ninth century; and at that time a useful method of fortification was the throwing up of large mounds, and to this could be attributed the presence of the Castle Hill. The Normans had much to occupy them, and it was probable in most cases, as certainly at York, they availed themselves of such defences as they found ready to hand. Of the present walls only the inner part of the gateways and a portion of the wall above the Layerthorpe postern presented any distinct Norman feature. In concluding, Mr. Clark gave a general description of the existing defences, remarking that it was curious to note that in the existing walls the foundation was for the most part very shallow, and also that parts of the wall, especially the oldest part at Layerthorpe, was very thin, so as to afford no possibility of a rampart walk. York he considered was fortunate in its gates, though they had been most injuriously treated. The walls had been so patched and repaired that it was difficult to form an opinion of their age, but the oldest parts seemed of the Decorated period. In a few concluding remarks, after reading his paper, Mr. Clark said that go where they would they would see that a determination prevailed, so far as knowledge extended, to do that which was right in the preservation of the remains of antiquity. He considered that one of the objects of a society like the Yorkshire Archæological Association, if it did not tend to increase the importance of archæological instruction, tended to the conservation of monuments of antiquity.

Under the guidance of Mr. Clark, the company then visited those portions of the defences within the grounds of the Philosophical Society. Luncheon was afterwards partaken of by a large party in the De Gray Rooms.

Subsequently the visitors made a further inspection of the fortifications, including the Roman Wall uncovered on the premises of Mr. Lund, and likewise a portion of the wall at Layerthorpe, which is under repair by the Corporation.

#### PRESERVATION OF TIMBER.

AT a recent meeting of the Academy of Sciences, Paris, M. N. Boucherie made a communication as to the preservation of timber by the use of carbolic acid, which substance, according to his experiments was far from giving satisfactory results. Pieces of timber impregnated in 1869 with a solution of carbolic acid to the extent of a half, one, and two per cent. respectively, were placed in earth very rich in vegetable mould, and taken out in the month of May last in a state of complete decomposition. It is possible that, by employing more concentrated solutions of the acid, more favourable results might be obtained, but the slight solubility of this substance in water would render such a proceeding difficult, for it would then become necessary to add some costly solvents. Besides, carbolic acid, the antiseptic properties of which are undeniable, does not combine with the timber, it only impregnates it, so that when exposed to the action of water, it is gradually taken up, and at the end of a short time, leaves no trace of its existence in the pieces of timber which have been treated with it. The other substances which have been proved to be efficacious, such as sulphate of copper, creosote, etc., either are insoluble in water, or permanently combine with it, so that their preservative action remains constant.

The employés of Mr. William Downs, builder, Hampton-street, Walworth-road, dined together on Monday last at the Railway Tavern, New Malden, Kingston-on-Thames, to celebrate the completion of the premises recently erected near the Elephant and Castle Railway-station.



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## ILLUSTRATIONS.

ITALIAN SCULPTURE IN THE SIXTEENTH CENTURY.—WOODCOTE, WARWICKSHIRE.—TAVERHAM HALL.—HOMER CONVERNORUM, PURNESS ABBEY.—FOUNTAINS ABBEY.

## OUR LITHOGRAPHIC ILLUSTRATIONS.

## ITALIAN SCULPTURE OF THE SIXTEENTH CENTURY.

FOR description of this double-page illustration see Dr. Zerffi's article, p. 162.

## CISTERCIAN ARCHITECTURE.—FOUNTAINS ABBEY AND PURNESS ABBEY.

For information about these two illustrations, see our first leading article this week.

## WOODCOTE, WARWICKSHIRE.

This mansion, of which we give a perspective view, together with a plan, was erected a short time since for H. C. Wise, Esq., from the designs of Mr. John Gibson, architect, of Great Queen-street, Westminster. The material used for the walling is Woodcote stone, from Mr. Wise's own quarries, situated about half a mile from the site. The roofs are covered with Wilnecote tiles. The principal staircase is of stone up to the first floor, and of oak above. The offices and stables are of stock brick, with stone dressings. The builders were Messrs. Trollope and Sons, and the clerk of works, Mr. Wise's steward, Mr. John Nicks.

## TAVERHAM HALL, NORWICH.

Taverham Hall is built on one of the oldest estates in Norfolk, and occupies the site of an old mansion of that name, which had fallen into such a dilapidated condition as to render restoration impossible. The architect from whose designs the present mansion was erected is Mr. David Brandon, F.S.A. The builder was Sir John Kelk. The materials are red brick for the walling, with Bath stone dressings. The roofs are covered with slates. The upper portion of the tower shown in the view is not finished. The owner of the estate for whom the house was built is J. N. Micklethwaite, Esq.

## GALLERY CONSTRUCTION.

RECTANGULARITY of plan seems to be an inalienable property of architecture, as much so as the tee-square itself is regarded as the indispensable instrument of an architect's office. Few architects would think of transgressing the rule of right-angle walls, even when important acoustical considerations demanded a change. These observations bear upon a hint we throw out here, apropos of galleried buildings. Why should galleries in churches and other places of assembly be so invariably constructed upon a rectangular plan? A better arrangement, we think, and one more conducive to sound, would be to make the end galleries opposite the pulpit or platform of curvilinear shape, or with splayed ends projecting at an angle, the central portion of front being kept parallel. This form would reflect sound; it would meet the frequent objection made against galleries, that their horizontal lines cut through and interfere with the architectural effect; and it would remove that temporary-stagelike effect a straight gallery always has. As to the construction and form of soffits or ceiling, the gallery may be supported, as usual, on a straight breastsummer or beam, the salient angles or curved parts being cantilevered horizontally. There is no great objection, however, to continue the sloped and coved ceiling to meet the curved or splayed front. In this case the intersection of the two planes would give an arched contour to the gallery, which would be certainly unobjectionable and original, if not pleasing, as it would diminish still more the awkward horizontal lines complained of. A segment of a circle would probably present a more agreeable form than the canted plan.

Gallery ceilings are generally the greatest eyesores in a galleried building; the usual forms they take are plain, horizontal, or sloped surfaces, or coved soffits abutting against a breastsummer,

which is supported by columns. We throw out a suggestion here, and we have seen one or two good instances of its adoption, namely: let the ceiling take a coved form in preference to the straight or sloping form, which always has a disagreeable effect; let this soffit abut or die against the supporting beam, which should be of sufficient depth to form an architrave, and from the front face of this beam project cantilevers, or brackets, horizontally, to support the front of gallery, which may project three or four feet from the beam. Such an arrangement far surpasses the clumsy methods usually adopted, in which the gallery pillars stand immediately, or nearly, underneath the front edge of gallery. The front bracketed portion may be of woodwork, and admit of decorative treatment. In some cases the gallery trusses may be in wrought woodwork or cast-iron exposed, which relieve the monotonous surface of plaster ceiling. Gallery ceilings may often be groined with effect, so as to give headway for the aisle windows. A simple mode is by forming domical cells, as in St. Martin's Church, Trafalgar-square, one of Gibbs's churches, we believe.

In Dr. Parker's new City Temple, the galleries surround the building, the ends being circular, and the inner vestibule wall is also of a segmental curve to assist sound. The gallery is supported by straight beams, and a treatment is adopted somewhat similar to the plan above proposed, brackets being brought out from the caps of columns to carry the curved front. We think, however, the ceiling of gallery might have been formed somewhat differently, though the arrangement is certainly a step in the right direction. Galleries of some form will always be necessary in town churches and buildings for large assemblies, however disagreeable adjuncts to Gothic buildings, and hence it is necessary to provide for them in the least objectionable manner.

## FOREST CONSERVANCY IN INDIA.

IN the central provinces, where the forests are irregularly distributed, it can only lead to a treacherous semblance of certainty to count the trees in a given small portion of the area, and then estimate the aggregate number of trees over the whole area by a simple process of multiplication—two all-important points not being ascertained, viz., what the whole area is, and whether the part counted was of average richness in trees; but efficient steps have been taken, as regards forests but little known, to record full and accurate data regarding the rates of growth of various kinds of trees under different circumstances, so that, when valuation surveys become possible, this equally necessary element in the calculation of the "rate of supply" will be available. A close examination of the old teak-bearing hills of Mundlah shows that the hills on which the teak formerly grew in profusion, although bearing traces of much injury (little being left for present use), yet that the future prospects of these forests do not appear so hopeless as they were considered some years ago. More or less examination has been made of other forests tracts but little known, but they mostly tend to show that strict conservancy must be exercised, and that the tracts have been neglected, and likely enough from unavoidable causes; for we must remember that the officers have to contend with no common difficulties. As to the protection of the forest and work for their improvement, very much has been done, and is doing. In the Sanguar and Norbudda territories, every patch of jungle, however small, was supposed to be directly attended to by the conservator, and all applications to cut timber were referred to him, and it need not be added that the task was too vast for any one to accomplish. But persevering energy accomplished wonders, and the remedy has since been applied, and the province parcelled out into six divisions, and an assistant conservator been appointed to the executive charge of each. The principle on which the present arrangement is based is, that each division should be, as much as possible, a complete circle of the

timber trade, and that the assistant in charge should not be distracted by having to attend out-lying forests, supplying, perhaps, a market with the requirements of which he has no means of getting acquainted. The plan of marking all trees by forest officers before felling has been introduced, but it has been found necessary to relax this rule in some cases, in favour of railway contractors. In the central division, pathways have been cleared round the demarcated reserves, and teak thinning has been carried on in the young teak forests on the Kumbharpanee Range of the Chindwarra district, to the extent of 11,900 saplings being taken out, and teak thinning has also taken place in the western division. These energetic operations cannot fail to tell beneficially on our future supply of timber from India. As regards the selection of trees to be felled by the forest department itself, the only places in which any new trees have been girdled or felled are Mundlah, Baitool, and Baree. The principle followed out has been to spare all trees which show promise of improvement, and to bring out for the supply of the country and revenue purposes all timber which is either already lying in the jungles, or which, from a bad habit of growth, unsoundness, or other reason, is not worth keeping in the forest. A good deal has thus been effected towards clearing the forest and supplying the people with the small pieces of teak they require for many purposes. Besides this, about 5,000 old teak stumps in Seonee, and 4,000 in Baitool, have been felled, the former chiefly fit only for the use of the people, and the latter for sleepers.

The following statement of stock exhibits, at a glance, the yield of timber brought out of the forests by Government agency during the year.

## NORTHERN DIVISION.

Mundlah forests	29,350 cubic feet teak.
Beejoragoruh	30,561 " " sal.

## PUCHMURREE DIVISION.

Boree forests	33,033 cubic feet teak.
Baitool "	34,000 " " sal.
Delakari forest	3,312 " " sal.

The value brought out in the former being 40,004 rupees, and in the latter, 75,517 rupees. The whole of this timber (with the exception of some large teak in Mundlah for the Department of Public Works) has been got from trees which had either been killed or felled previous to our getting possession of the forests, or which showed no signs of becoming more valuable if left standing. During the same period, it is estimated that other timber was taken from the forests, by contractors and others holding permits to the extent of 76,024 sleepers, and 6,645 timbers, to which must be added about 8,500 logs delivered to various public departments.

## CHIPS.

A new parish-church erected at Minor, N.B., was opened on Thursday week.

The Charing Cross Theatre is being enlarged.

The Theatre at Nottingham has just been entirely renovated for the second time since its erection, under the direction of its architect, Mr. C. J. Phipps, F.S.A.

The Church of Tidmington, Shipston on Stour, is to be restored, from designs by Mr. W. Knight, architect, of Cheltenham, at a cost of £750.

The contract for new market buildings, at Frome, Somerset, has been taken, and the work commenced by Messrs. Brown. Mr. Stent, of Warminster, is the architect.

A new Baptist chapel at Glanadda, Bangor, was opened on Saturday. Mr. Evan Williams is the architect, and Mr. Hugh Jones the builder.

A new Board school was opened on Thursday week at Lealholm, near Whitby. Mr. E. H. Smales, architect to the Board, designed the building, which accommodates 150 children.

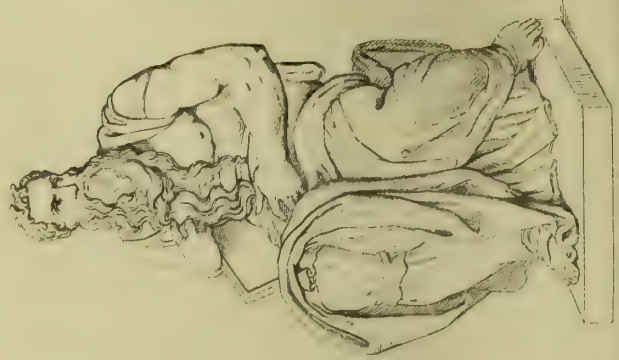
The School Board of Cowpen have adopted the designs of Mr. Thomas Oliver, of Newcastle upon Tyne, for both the Cowpen and the Newsham districts, Northumberland.

The Dean of Arches on Thursday delivered his judgment on the Exeter Reredos Case, reversing the decision of Mr. Justice Keating. He refused, however, to make any order as to costs.











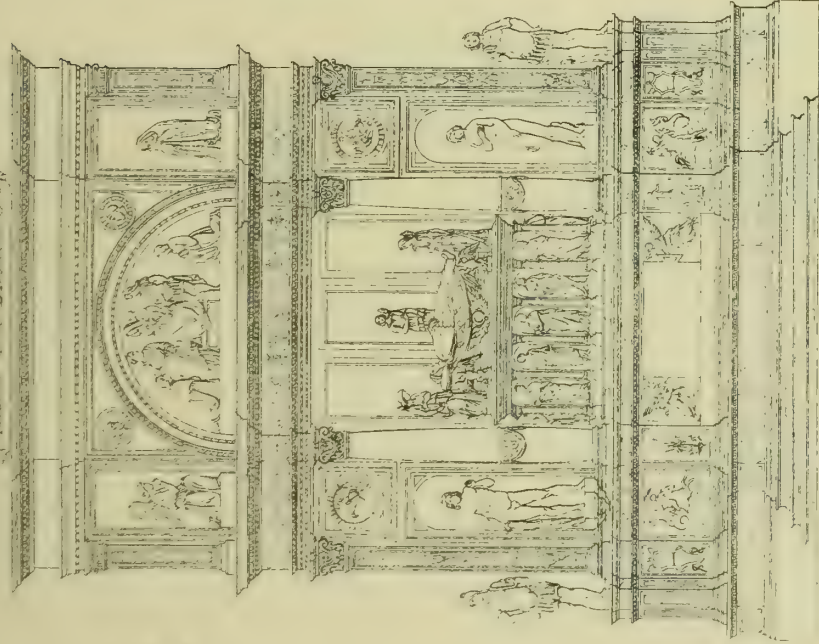


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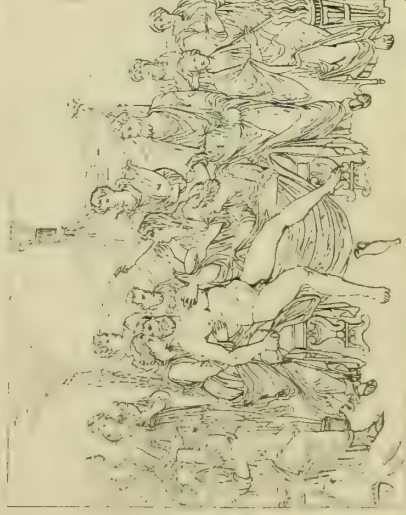
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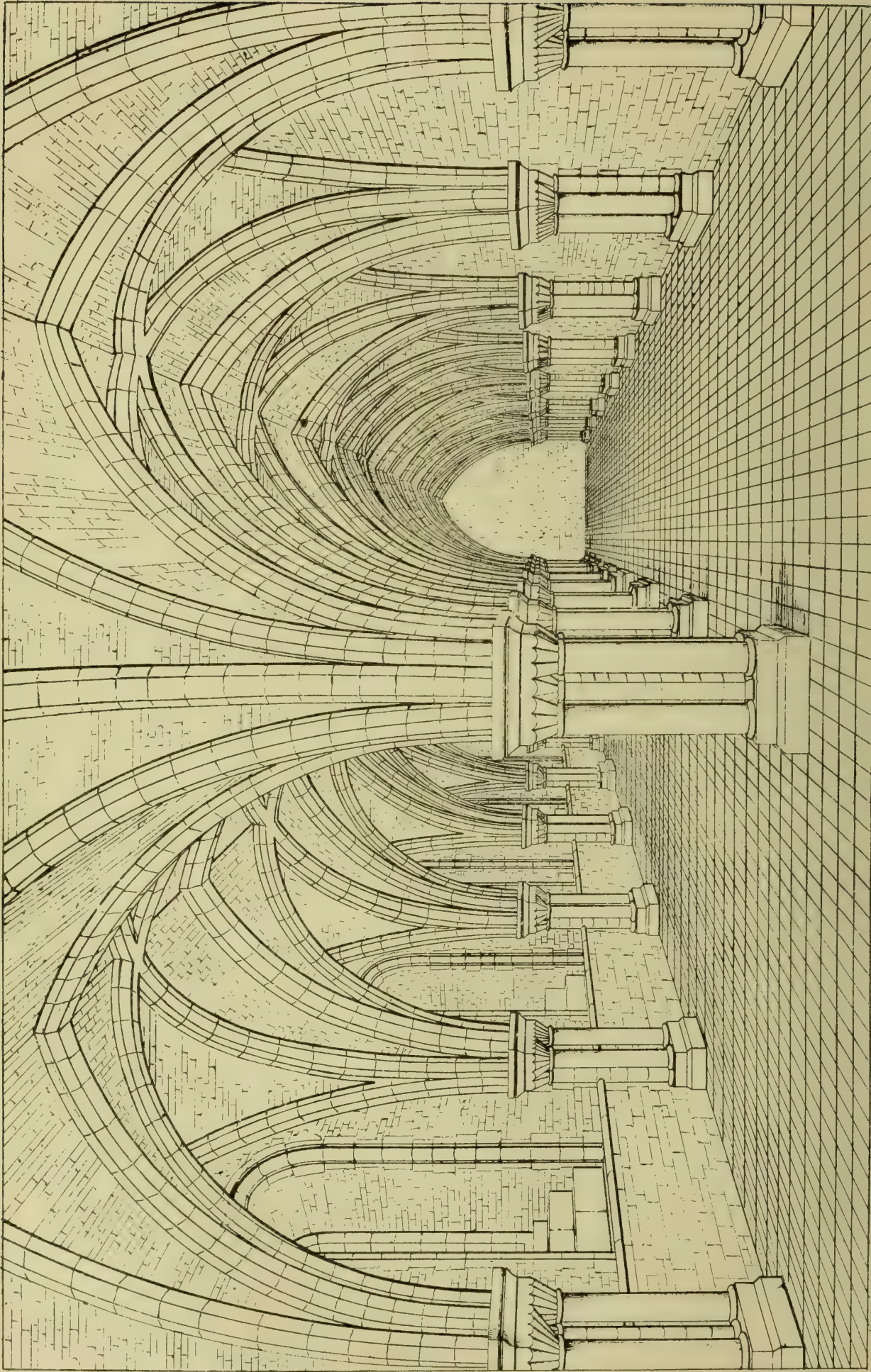






THE BUILDING NEWS AUG. 7. 1874.

TRANSITIONAL PERIOD



Edmd Sharpe.

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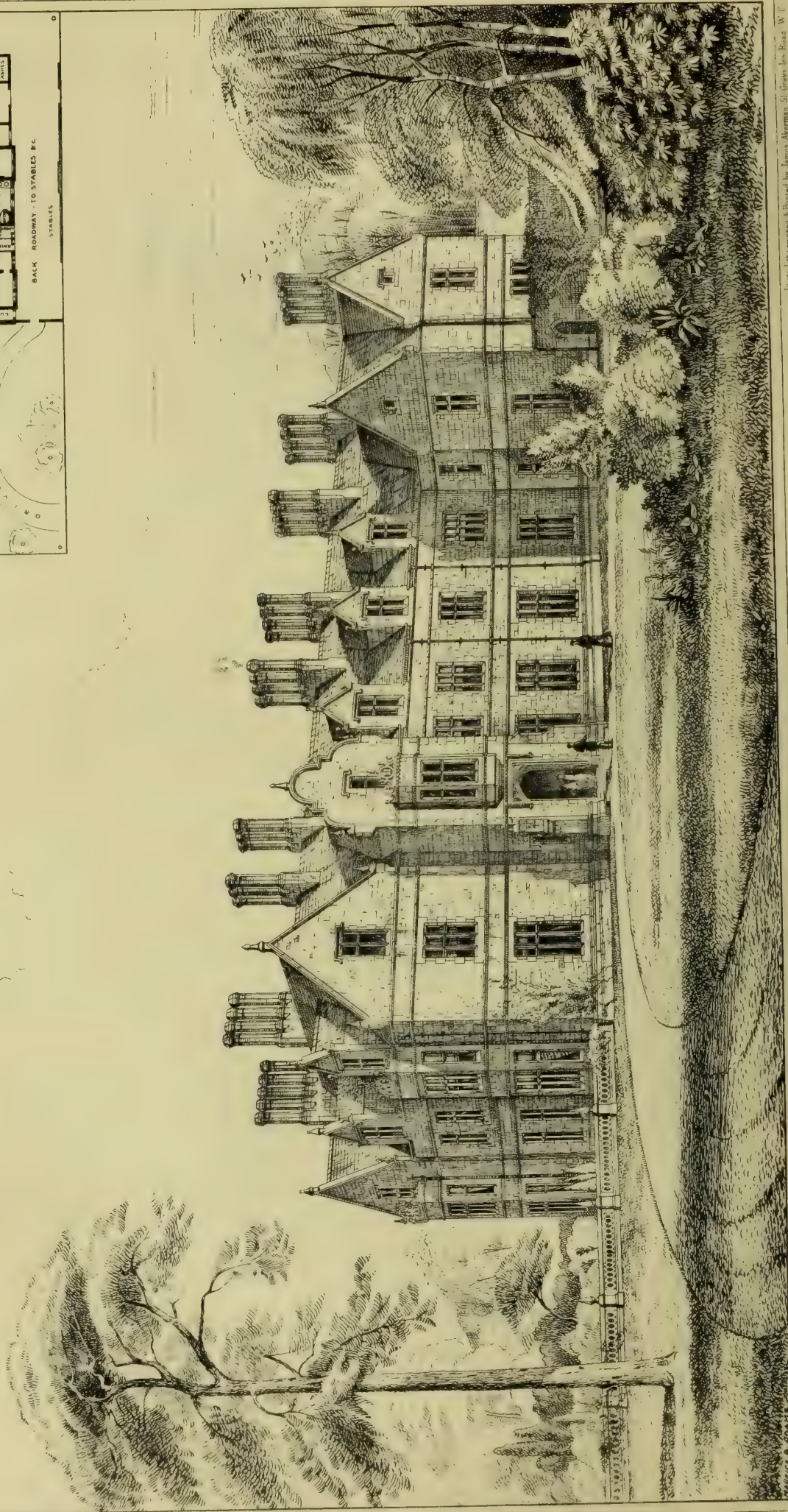
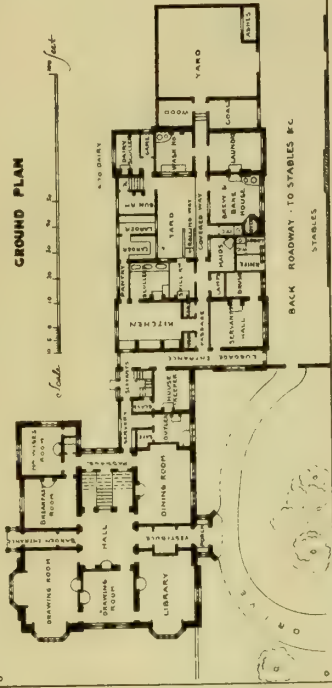
CISTERCIAN ARCHITECTURE. DOMUS CONVERSORUM, FURNESS ABBEY. INTERIOR VIEW.







WOODCOTE, WARWICKSHIRE  
THE RESIDENCE OF H.C. WISE ESQ<sup>RE</sup>.  
JOHN GIBSON, ARCHITECT

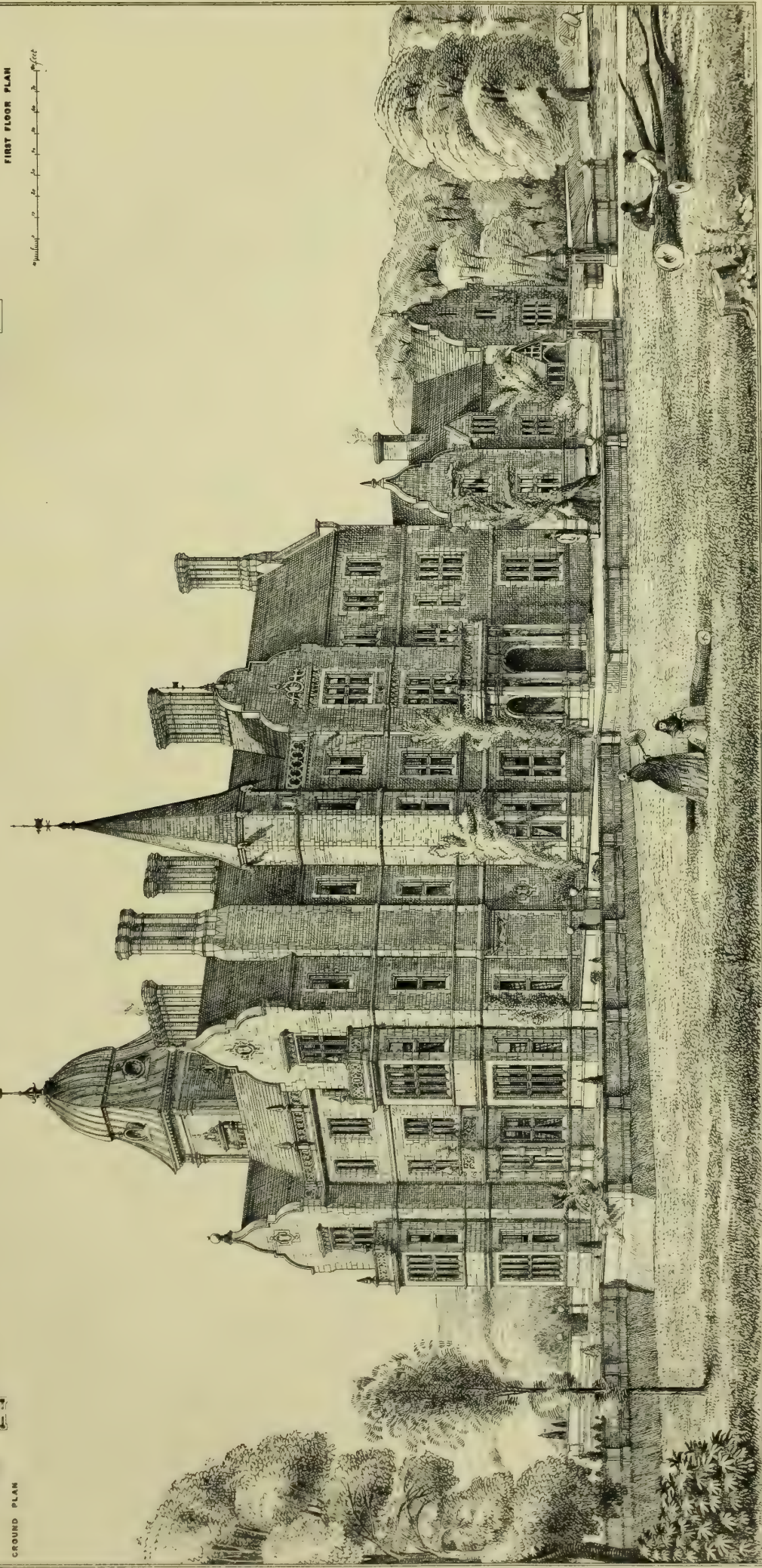




TAVERHAM HALL, NEAR NORWICH, NORFOLK.  
DAVID BRANDON F.S.A.  
ARCHT. ECT.



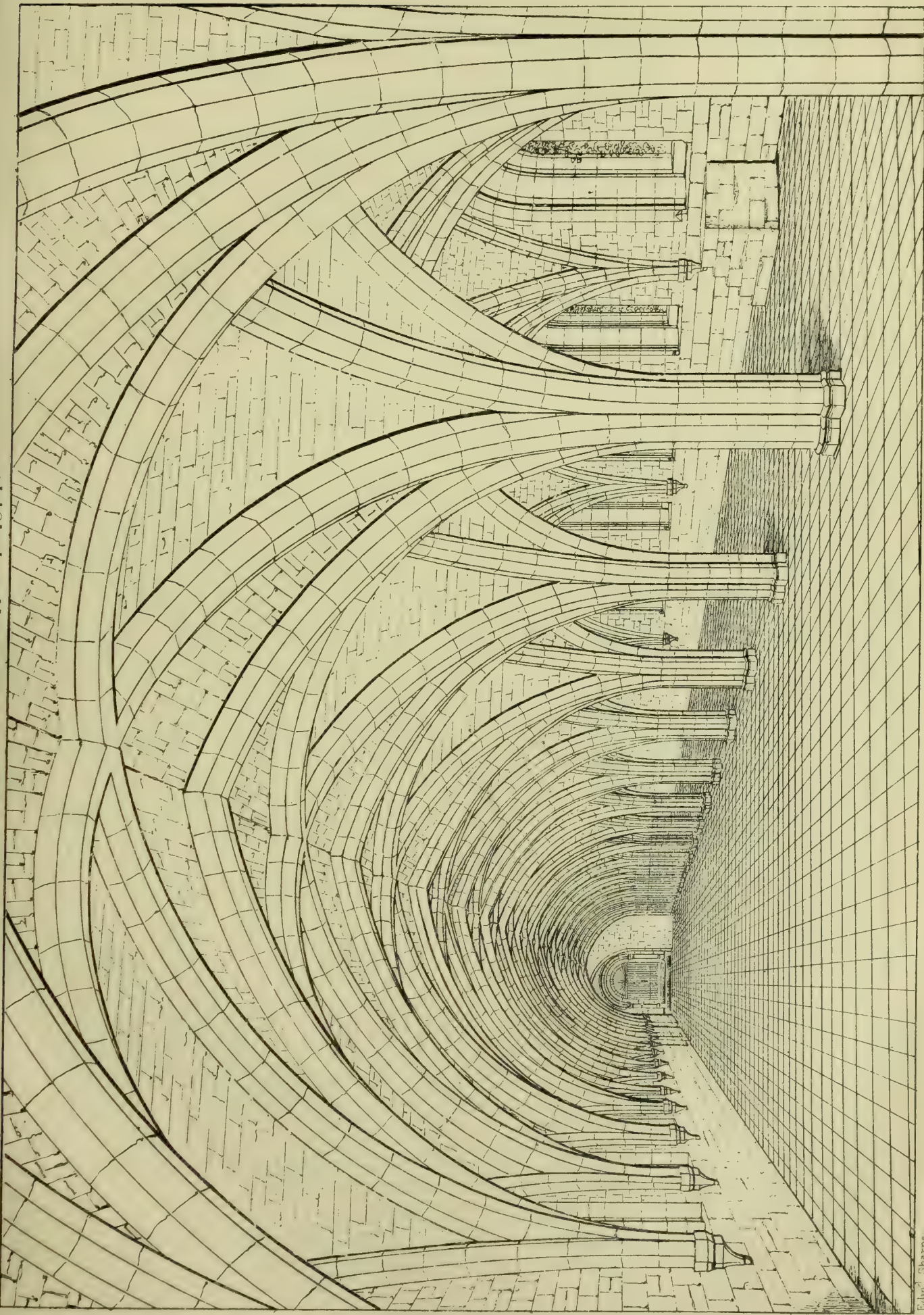
Scale of feet











Edna Sharpe

CISTERCIAN ARCHITECTURE. FOUNTAINS ABBEY, INTERIOR VIEW.

C.F. Kelly Photo Lith London E.C.







## THE DECORATION OF S. PAUL'S CATHEDRAL.

AN article in *Fraser's Magazine* for the current month, and written by Mr. Edward W. Godwin, reopens a topic that has become rather stale. As our own views have been pretty fully described, and have been indorsed by others, we simply here return to the subject to hear what Mr. Godwin has to say upon this somewhat vexed question. As may be anticipated, Mr. Burges has at last found a redoubtable apologist in Mr. Godwin. "Possessing talent and attainments surpassed by none," we are told, Mr. Burges's task in endeavouring to please such a "galaxy of masters" as the Dean and Chapter, the General and Fine Arts' Committees, is not a very enviable one. It may be so; but when we are asked, How is it that with such profound knowledge of Wren and the best Italian masters of the sixteenth century, the advisers of Mr. Burges did not give their views in detail to him before instead of after the models were prepared? we may simply remind the writer that such a proceeding would have been tantamount to an insult to the artist, or would have been equivalent to an admission on their part of the artist's incompetence. If Mr. Burges has been badly treated, he has only to thank those who placed him in that unenviable position before the critical and artistic world; or who, in spite of advice, persistently adopted a course of appointment which could not fail to be unsatisfactory, both on public and artistic grounds. If malcontents or "an active spirit of envy or jealousy" have been in the background, as suggested by Mr. Godwin, he must place it to this cause, and to nothing else.

But let us examine the criticism before us. The inadequacy of the models exhibited, showing the decorations proposed, is noticed. The writer says, "To try to see them in the way they should be seen is not an easy thing to do." Again, the colours are illuminated as they never could be in fact, owing to the sectional division of the models; the windows are opaque, and their shadowed recesses are unduly illumined. It is a pity, perhaps, Mr. Burges ever exhibited his models to the gaze of the public if he thought a small-scaled model would do injustice to his scheme. But, for the life of us, we cannot see why a model of half an inch to the foot should be so deficient in representative power, when Mr. Godwin knows very well architects seldom adopt so large a scale for their drawings. Again, why should colours be more confused than lines in a drawing of that size, if they are shown with any effect at all? If, as suggested, cartoons of the decorations had been prepared and reduced by photography to this scale, the result would have been a thousandfold worse than it is; as Mr. Godwin knows, as an artist, that the suggestion of colour as a whole is better without the confusing multiplicity of detail which such a mechanical reduction would have made. Again, if the scale of the model is against it, as being a concentration of colour in a small space—and this is really the argument—it can only be corrected by an increased amount of illumination, such as that which has been objected to. So, in fact, we think the model may stand very well for what it is worth, and especially also since, if the model looks confused under a glare of light, the darkened interior of the cathedral will look more so. It will be conceded that if Wren's instructions are reverently regarded, and his intentions are broadly known enough to discountenance many of the proposals of the scheme, recourse should be had to those modes of decoration which he would have favoured; but Mr. Godwin lays more weight on the second instruction of the Committee, which allows the architect freedom to elect for his models those Italian artists of the sixteenth century he thought best. He says Mr. Burges has wisely selected the masters of the first quarter of the sixteenth century to the Venetian of the last quarter—Perugino and Raphael; and that we should accept this more limited school, instead of widening it to the century which the instructions permitted. To this we demur, as it is not giving a fair scope to that particular phase of the Italian or the Venetian school which was the basis of the English revival, and on which Wren based his great work.

Taking a compartment of the nave of St. Paul's, Mr. Godwin proceeds to examine each

part. He says, "Nothing like the grand series of pictures below the windows of the Sistine chapel, or those in the Stanze of the Vatican, can even be thought of in connection with St. Paul's, for the only blank spaces of any importance are the great dome and the flat or saucer-shaped domes in each bay of centre and side aisles, and their pendentives." Under these limited conditions, we are told two courses were open: 1st, To keep the "windows of perfectly clear white glass to admit the maximum of light, filling the domes and pendentives with pictures and the panels with ornaments; or 2nd, to fill the windows with pictures, and keep the domes, &c., subdued, and occupied by ornaments only." In the general treatment of the nave, Mr. Burges, who is admitted to have followed a middle course, is thought by Mr. Godwin to have shown nothing contrary either to the spirit of the architecture or decoration of the early part of the sixteenth century. In detail, Mr. Godwin, however, objects to the way in which the domical ceiling of each bay is subdivided by panels, and in the confused or "muddling effect of colour, for there are thirty-six panels in each of these small domes, and only forty-eight in the much larger ones of St. Stephen's, Walbrook." We are rather surprised at this censure of an important part, after the general admission of satisfaction. It is, however, perfectly in accordance with the views on this portion we have before expressed. We contend such subdivision would destroy all unity, while the angels' heads in panels would be pitifully out of place. Coming to the clerestory, we are again told what we have regarded as the truth, namely, that the design would be excellent if the artist be temperate in the use of the darker tones of colour, "or even in the total omission of them." Again, we are told the triangular wall spaces on each side of windows are not satisfactory, for the seated figures look like blots of colour. The treatment of the "attic" or triforium is commended, the panels being filled with pictures and figures in chiaroscuro on a quiet blue-green. We are afraid this will prove too dissociative of the vaults and lower decorations.

Coming to the main order of nave, the wall-spaces bounded by the extrados of the arch and the horizontal line of cornice with the pilasters are filled with carved busts in medallions, which are pronounced right, though the bronze cupids and wreaths over capitals are equally condemned.

The casing of the pilasters and piers with Sicilian marble and red marble flutings, is, we are told (rather vaguely we think) done first to give a sense of richness, to secure light where most needed, and cleanliness as a non-absorbent material, the red flutings being on "the sound artistic principle of carrying down the richer tones of colour applied to upper part." The chiselling down the surface an inch or two for this slicing of marble is not thought at all as interfering with the stability of the fabric, an idea which is regarded as "too puerile to think of," though we are not told if such a meddling with Wren's work has a "reverent regard" for his wishes.

Mr. Godwin taunts Wren's obliviousness to deception, and instances the sham wall-screen over aisles and the inner brick cone of dome, as a sort of set-off to Mr. Burges's attempt to translate the stone surface into one of marble. We would remind the writer, however, that such arrows fall harmless. Wren's fame as an architect rests on too firm a footing. If Wren was "an engineer-architect, constructor, and nothing more," as we are told, he was all that an architect need aspire to—he was an artist of form and proportion, and if he thus considered only the higher attributes of his art, and left decoration to a subsequent age, it by no means follows that his views of merely decorative detail were not higher than some of his detractors imagine.

Coming to the domical ceiling of aisle, the subdivisions and colours proposed are considered out of scale with those of the nave, and the writer suggests that the latter should be enlarged. The vertical panels of marble in the space below aisle window are rightly condemned, as opposing the original design, and as an ill-judged decoration.

We were not prepared to see such a wholesale censure on some of the more prominent features of the design, coming from Mr. Godwin, though we believe they are thoroughly honest ones. Yet we are told that with these exceptions, the design for nave emphasises Wren's work, is not opposed to the work of the best sixteenth century "artists," is magnificent without being "intemperate, rich without being gaudy, and bright without being garish."

The design for choir and apse is acknowledged by the writer to be all we have asserted, the colour and gilding of triforium is thought to be intemperately over-coloured and overpowering; the pilasters hot with red; the coloured pictures of clerestory and window-glass confusing and conflicting; and especially (which we before noticed) the discontinuity created by the different treatment of the choir triforium to that of the nave, and the consequent loss of length to the edifice. As Mr. Godwin justly says, the triforia of nave and choir should have been the same in treatment. The ill-drawn and ill-coloured colossal figure of the Majesty in the semi-dome of apse is even too much for the writer, though he says it should be large, and we are told gravely that it would have been better if half a head shorter, and less crushing. We are further told all these defects of detail could be easily rectified, and that the design, pose, colour, the subdivisions of ceiling, the "predella" pictures, gilding, &c., may all be changed, and yet remain in idea as the artist-architect designed them; and homogeneity of colour may be attained after all. All this is very easily done!

One feature Mr. Burges has treated "in a manner altogether praiseworthy;" it is the ever-recurring rectangular panel in wall and pier, &c. Instead of painting these, they are filled with inlays of pale-coloured marbles, on a black ground, conformable to the spirit of sixteenth century artists, it is said. If the ground had been any other than black we think it would have been preferable, and the hues of the painted windows quite as effective. Mr. Godwin admits, frankly, another scheme of decoration would have been possible if stained glass had been omitted; that plainer colouring to piers might have been adopted, and a later phase of sixteenth century decoration applied. As to the latter point indeed, we think Mr. Godwin has hardly shown us why other later artists, as Michael Angelo, besides Perugino, should not have been consulted, seeing that St. Paul's belongs to a later age of the Italian revival. Wren's intentions as to the coloured decoration, however scanty they may be, is a point beside the question; it is one of fitness and architectural propriety; and nothing yet advanced by the Executive Committee in their recent explanations has thrown a ray of light to clear up their proposed scheme.

Dealing with the criticisms which have been made, Mr. Godwin strangely thinks Mr. Gambier Parry too much of a Gothicism to say anything worth listening to about Mr. Burges's design, though he is admitted to have written on painted decoration both practically and well. Here, then, the chief of the "Fine Arts Committee" is polished off. But let us see how Mr. Parry's objections are met. The objection as to the models not being sufficient is trivial. The next, that they condemn the design as not exhibiting a "reverent regard" to Wren's intentions. We concur in this; but the writer deals with these intentions as if Wren had none worth considering, and this is the issue after all. It is Goth *versus* Classicist. Mr. Godwin alludes to the raised panels left in block for carving: this may be only presumption after all. The writer says, "How can the known style of his architecture be adduced as evidence of his intentions as to the coloured decorations?" We simply answer, by having regard to those which lent themselves best to that style. We know mosaic was contemplated for the dome; but this does not mean gaudy-colouring, heads, and what have been called "peeping Toms" in other parts. We are told that "sprawling allegories, splashes of fore-shortened figures, clouds, and cupids were in full vogue," and that Italian decoration was not worthy to be called a school. If so, is it not wrong to go back to a still earlier era, when Mediaevalism had hardly been shaken off, and the restraints and naturalism of its worst kind existed? It is quite certain that Wren, who is accused of a "heavy, mathematical mind," would have rejected the sprawling and splashing style of clouds and cupids he is before taunted with.

After the Committee's protests, Mr. Fergusson comes in for a share of the writer's wrath. Of the opinions of Mr. Donaldson, Mr. Beverley, and Mr. Crace, they are quickly passed over as of no value; aerial tints and sparing colours have no favour in the writer's eyes. The anonymous newspaper criticisms seem to share a like fate, though some attention is bestowed on the opinion of the *Pall Mall Gazette* for the "careful examination that writer has evidently given to the designs." As to the dome of St. Stephen's, Wal-



brook, being cut up by plaster mouldings, what if they are? It will be found that the analogy does not hold; that the latter is a dome of far greater size, and is less divided than the domed ceiling is proposed to be. In conclusion, let us ask, how does the writer, or the Executive Committee, know that there are "not many contemporary artists" who could give proof of their power in decoration? Were not all our great artists and architects unknown at first? Wherefore, then, should it be presumed that only one man was fit for such a task? This is a reason, indeed, why the whole scheme should have been submitted to competition. But we were certainly prepared for more cogent reasons than those adduced in *Fraser's*; we had hoped, indeed, that the question of colour would have been looked at with a far higher motive than that of being in conformity with a narrow class of artists of any particular school, or that anything like the *odium theologicum* should have been infused into the question. Throughout the discussion of this question we think a far wider and more scientific grasp of the subject might have been taken without in the least degree sacrificing the demands of correct art and taste. The problem was to decorate a large interior with the least amount of colour and with the maximum amount of light-reflecting surfaces.

#### THE BRITISH ARCHÆOLOGICAL ASSOCIATION AT BRISTOL.

LESS favoured by the weather than its sister society last week at Ripon, the British Archæological Association commenced its thirty-first annual meeting at Bristol on Tuesday, amidst a drenching rain. The inaugural proceedings took place in the Grand Jury room of the Guild-hall, and a visit was then made to some of the places of interest in the city. The first of these was the well-known church of St. Mary, Redcliffe, which was described by Mr. George Godwin, F.R.S., F.S.A., the editor of the *Builder*, and architect of the restoration.

Mr. Godwin said: A story, often related and long accepted, tells how that Simon de Burton, having to meet Sir Farrars Nevill at a tourney on St. Mary's Hill, in the year 1285, made a vow, according to the fashion of those days, that if he conquered he would there build a church to our Lady, and, that being successful, he did build a goodly church, which was dedicated to the Virgin Mary by the Bishop of Chichester on Christmas-day, 1301. The year in which he commenced to build was said to be 1293 or '94. Then the history went on that in 1376 "William Canynge built the body of Redcliffe church from the cross-aisle downwards, and so the church was finished as it is now." We do not hear of this first William Canynge after 1396, the date of his will. In 1442, as we are told, the second William Canynge, "with the help of others of the worshipfulle town of Bristol, kepte masons and workmen to edifie, repayre, cover, and glaze the church of Redcliffe." He did so much, indeed, and in so exquisite a manner, according to the received account, that he came to be considered the founder of the church. In 1445 a storm threw down the spire, which did great damage at the west end of the church, but Canynge set this all right again. He died in 1475. Looking to the church itself, we find it consists of an outer and inner north porch, a tower, nave with aisles, south porch, transepts with double aisles (a most rare occurrence), rooms for residence, and Lady Chapel. A number of years ago I gave some particulars of the church on the occasion of a visit by the Archæological Institute (printed in their Bristol volume); and, desiring to treat existing opinions with respect, said as to the inner porch and lower part of the tower, that they might be earlier than the time of Simon de Burton—certainly were not later. Speaking, however, with less deference and more precision now, I have not the least doubt that they were built long before Simon de Burton is said to have commenced the work. The year 1250, by which time Salisbury Cathedral was nearly finished, is later than I should be inclined to date them; 1240 is probably nearer the right time. Nor is it likely that a porch was built without a church; and pieces of Early English masonry worked up in the walls of the present church, and brought to light during our works, confirm to some extent this opinion. It is clear, therefore, that the story, so far as it credits Simon de Burton with the commencement of the church, is incorrect.

Nevertheless he may have done good work there, and the misstatement may be only verbal. The tower, when carried up just above the range of niches, was roofed over. The evidence of this is obvious inside, but the work probably went on again before the close of the century, when the Early Decorated style was growing into shape. At Wells and elsewhere good work in the Decorated style had been done by 1300. The south porch, the south transept, and much of the lower part of the rest of the church, belong to the same style, and the north porch is an exquisite specimen of it. The tower is as fine a thing of its kind as can anywhere be found. The remainder of the church, including the great clerestory, or oystertory, as Wm. Wyrcestre calls it in his curious Itinerary (1478), is of the Perpendicular period, and may belong to the time of the second Canynge. Mr. Godwin next proceeded to point out some of the leading features of the church, such as the north porch and the "treasury." He then passed on to the monuments, and in conclusion referred to the restoration of the church and the ruinous condition in which the structure appeared when the work of restoration was commenced. Ground was piled round the church to a considerable height, and the outer shell was simply a mass of honeycombed stone. Alderman Proctor, Mr. R. P. King, Mr. W. P. King, Mr. S. V. Hare, and others formed themselves into a committee, and that committee, which now consisted of their sons rather than themselves, still went on. The funds obtained were comparatively small, and came from a few individuals, who, however, pressed forward, and when there were no funds forthcoming they would be indebted to Alderman Proctor, their treasurer; and now, thanks to them and to Mr. Mervyn King, Mr. C. B. Hare, and he must not forget the vicar, the Ven. Archdeacon Randall, the progress had been very satisfactory. It had long been the dream of certain Redcliffe men to put up a spire; but the report of well-informed persons had told them that the tower was not strong enough to bear it: and this belief prevailed for some time; but by duly thinking it over and cautiously strengthening the foundations and enlarging the tower at the foot, they would see the spire was there safe and sound, and he hoped it would remain there for several hundred years. He would mention, as to the west door, which has been quite recently finished, that it was restored after a fashion some years ago, all the mouldings having been cut away and altered. By a curious accident, William Wyrcestre had recorded in his Itinerary a technical description of the mouldings forming the doorway, as given to him by Norton, the master of the works; and from this, with the aid of the published comments on it by Professor Willis, they had brought it back, so far as they knew, to its original form—a curious, probably unique, incident. He must not forget to mention the name of Mr. W. Rice, the enthusiastic clerk of the works, who was almost the Quasimodo of the place. He knew every stone in the church. Mr. Godwin mentioned some of the modern glass met with in the edifice, and said that they had a general scheme in this direction, so that everybody who now contributed must put in a particular subject. At the conclusion of Mr. Godwin's paper, Mr. J. R. Planché, Somerset Herald, made some remarks on prominent objects in the church, and agreed with Mr. Godwin in the early period ascribed to the crossed effigy in the transept.

After luncheon in the Infant Schoolroom, Canynge House, in Redcliffe-street was described by Mr. J. F. Nichols, the City Librarian, and the party next visited Temple Church, where Mr. Taylor read a paper. In the outset he referred to the doubt which had been thrown upon the point whether the Knights Templars ever had an establishment in Bristol, in spite of tradition, presumptive evidence, and the existence of the present church of the Temple. He then proceeded: In the course of the later restorations, the interesting discovery of the foundations of the earlier building revealed the fact that a church which formerly stood on the site of the present nave was circular, or rather of an oval outline, the dimensions being 40ft. by 23ft. That such a structure had existed might have been inferred from an inventory of the time of Edward III. (A.D. 1338) of the estates of the Knights Hospitallers in England, to whom the manors of the Templars had been granted upon confiscation. In that document they found comprehended within the manor of Temple Combe, under the head "Bristol," that the successors to the Templar estate had here appropriated, besides certain

rentals, a small church (*parva ecclesia*) of the value of four marks per annum. Many other places were mentioned within the district where property derived from the Templars was held, but Bristol was the only place where a church was said to exist. This fact showed that the Redcross Knights not only here held property, but that they had in Bristol a religious settlement; and the small church of Prior Thamesrefoft was doubtless the superstructure of the one whose foundation was recently disclosed. After dwelling at great length on the rights and privileges which the brethren of the Knights Templars enjoyed in Bristol, and quoting many interesting documents, Mr. Taylor came to speak of the present structure, the oldest portion of which he said was St. Catherine's or the Weavers' Chapel, in the east end of the north aisle. The remainder of the church, including the pillars of the nave and north and south ranges of the windows of the side aisles, were of the Perpendicular period, and belonged to the 15th century. There had been some interesting remains of ancient coloured glass in the windows of the chancel and Weavers' Chapel, but these had been recently removed.

In reference to the crypts both at St. Nicholas and St. John's Churches, Mr. Taylor said they well illustrated the religious uses for which they were intended. Both were remarkably complete examples of their kind—in the Perpendicular style of the fifteenth century—and both were used as places of meeting for religious guilds, and for holding regular commemorations, with dirge and mass, for the benefactors of the church whose bodies were rested in the altar tombs. St. Nicholas, crypt had its own procurators, or wardens, distinct from those of the church above, and also its separate endowments, the "upper church" being called in the proctor's book the "high church." Pointing out that the existing records of the crypt began in 1531, he gave some extracts from some of them, and further observed that it was here that the festival for the Boy Bishop on December 6th was kept up with great completeness.

In the evening the President's banquet was given at the Royal Hotel, the President being Mr. Kirkman D. Hodgson, M.P.

#### THE METROPOLITAN GAS SUPPLY.

AT the last weekly meeting of the Metropolitan Board of Works a report was presented by a committee advising the Board that it was their duty to promote in Parliament a Bill for enabling them to provide an independent supply of gas to the metropolis. The gas rental of London, it was incidentally stated, now exceeded two and a half millions sterling. It was pointed out in the course of the debate that, in spite of all the efforts of the Board, the price of gas had been increased, and that further control in respect of "due care and management" was needed. The report was adopted without opposition. If the Board will only set vigorously to work and accomplish the recommendation of the report, it will deserve and receive the gratitude of the inhabitants of the metropolis, more than for anything it has done since the building of the Thames Embankment. Londoners—especially those north of the Thames—are tired of the waste, the blunders, and the extortion of the gas companies. It should be borne in mind that the amount of two and a half millions sterling, adopted by the Board as a basis of calculation, large as it is, is only that paid last year.

In 1872 the prices charged for gas by the several metropolitan companies were, per 1,000 cubic feet, as follows:—The Gaslight and Coke Company, 3s. 9d.; the Imperial, 3s. 9d.; the South Metropolitan—mark this—3s.; the Commercial, 4s.; the Independent, 3s. 2d.; the London, 3s. 9d.; the Phoenix, 3s. 9d.; the Ratcliffe, 3s. 9d.; and the Surrey Consumers' Company, 3s. 9d. In 1873 five of these companies raised their prices as follows.—The Gaslight and Coke Company to 4s. 4d.; the Independent to 3s. 6d.; the London to 4s. 6d.; the Phoenix to 4s. 6d.; and the Surrey Consumers', first to 4s., then to 4s. 6d. This year's prices have been still further raised by the Gaslight and Coke Company to 5s., and by the Imperial Company to 4s. 8d.

The foundation-stone of a new infant-school was laid at Wednesfield, Staffordshire, on Tuesday. The architect is Mr. John Bate, jun., of Wednesfield, and the builder Mr. Rollason, of New-street, Wolverhampton.



## ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETIES.

**BUCKS ARCHÆOLOGICAL AND ARCHITECTURAL SOCIETY.**—This Society had its annual excursion on Tuesday, the 21st of July. Archdeacon Bickersteth acted as cicerone. After inspecting the churches at Wendover and Lee, the party halted for the purpose of examining Grimesdyke or Grim's Dyke, a remarkable fosse or trench which runs nearly east and west through this part of Bucks. St. Leonard's Church was next inspected, after which Cholesbury Church and Camp were visited. Chesham was next arrived at, and after inspecting the fine church here, the party adjourned to the Bury, the residence of W. Lowndes, Esq., where they partook of luncheon. The annual meeting of the Society was next held, the Archdeacon occupying the chair. An interesting address was then delivered by the Rev. Mr. Burgess upon the earthworks and other antiquities to be found upon the Chiltern Hills. Some conversation ensued upon this subject, and also upon the origin of the "White Leaf Cross," at Monk's Risborough, which Mr. Burgess thought commemorated some victory gained by the Saxons. The party then commenced their return journey, and after inspecting the Abbey Church at Great Missenden, arrived at Aylesbury about eight o'clock in the evening.

**ESSEX ARCHÆOLOGICAL SOCIETY.**—The annual excursion of this Society took place on Thursday week. A large party mustered at Bishop's Stortford at 12 o'clock, and were conveyed in waggons to Great Hallingbury Church, now in course of restoration. The rectory house, a new building now being erected in concrete, was next visited, and the party then drove to Barrington Hall, where luncheon was served. The business meeting of the Society was then held, and the annual report read. The principal officers were also re-elected. The Rev. B. Lodge called attention to the mural paintings discovered in Copford Church, and earnestly impressed upon the meeting the importance of preserving copies of these ancient works of art. A visit was subsequently paid to Hatfield Parish Church, which was described by the Rev. O. W. Davys, who also detailed the results of some recent excavations at the east end, made with the view of tracing the foundations of the old Priory which formerly occupied the site.

**THE KENT ARCHÆOLOGICAL SOCIETY.**—The annual meeting of this Society commenced at Folkestone on Wednesday week. The business meeting was held at the Railway Hotel, under the presidency of Earl Amherst. The annual report dealt at length with the concerns of the association, and announced that the 9th annual volume of *Archæologia Cantiana*, published under the auspices of the Association, had been issued during the year. A visit was then paid to Cæsar's camp, where Mr. Jeaffreson read a paper advocating the theory of the Keltic origin of the remains. The party next repaired to Paddlesworth, and inspected the old church, of which the original structural features remain unaltered. Decorative art there is none; the walls throughout are built of flints and ragstone, which are whitewashed on the inside. The roof is still unceiled. The return journey to Folkestone was accomplished, and with as little delay as possible the party assembled in the handsome cruciform parish church of St. Mary and St. Eanswith, which was first built by Nigell de Mimeville, lord of Folkestone, at the latter part of the reign of King Henry I., or the beginning of King Stephen's reign. The vicar, the Rev. M. Woodward, read a paper on the history of the beautiful edifice, which is noted for its groined roof, central tower, monuments of ancient date, primitive stone seats, and modern reredos. It was not, it appears, until the fifteenth century that the people of Folkestone improved the fabric, which had previously been often assailed and threatened with devastation. The window erected to commemorate the birth at Folkestone of the celebrated William Harvey, a tablet to the memory of whose mother is within the building, and which cost, we believe, £700, attracted much attention. Dinner was provided at the Town Hall, and the evening meeting held in the Council Chamber. On the following day nearly 200 ladies and gentlemen assembled. Western-hanger Station was the place of rendezvous, and there carriages were in waiting to carry the company to Horton Priory, which was reached about a quarter past ten. This splendid specimen

of Norman architecture—one of the most beautiful and pure extant—was described by C. Baily, Esq., F.R.I.B.A. The Priory was built by Robert de Vere, for the residence of eight monks, and was given to the Priory of St. Pancras, Lewes. What remains of the original structure is a beautiful specimen of the purest style of the Norman period of the twelfth century. By the courtesy of the occupier, the whole of the interior was explored, and Mr. Baily's extensive archæological researches were utilised in a manner which conveyed to his audience a most comprehensive and vivid description of the building, and in imagination the old Priory was again peopled with the monks of the twelfth century. Leaving Horton Priory at 11.30, a start was made for Elham, which was reached at 12.40, and a visit paid to the old church, dedicated to St. Mary. The Rev. Walker Wodehouse first gave an account of the valuable library presented to the church in 1809, and which includes some rare volumes of the seventeenth and eighteenth centuries. The Vicar read a long paper, from which it was gathered that the edifice was built between 1180 and 1200. At 1.40 the journey was continued to Lyminge. The Rev. Canon Jenkins, the rector, here gave an account of his discoveries of the foundations of the ancient Basilica, which the Rev. antiquarian has so ably described in the last volume of the *Archæologia Cantiana*, but an oral description on the spot rendered the burial place of St. Ethelburga the Queen, in 1133, a place of increased attraction to the antiquary. The foundations have been excavated to the depth of 20ft., and it was shown that the vandalism of a past period had torn up the vast foundation and utilised the stones for the purposes of erecting farm buildings, walls, and even pigstyes. By the hospitality of Major Kirkpatrick, luncheon was partaken of at Monk's Horton Park. After resting a while the procession started for Brabourne Church, which was described by Sir Gilbert Scott, R.A., LL.D. J. S. Scott, Esq., gave the genealogy of the Scott family, whose tombs form so marked a feature in this church.

## ARCHÆOLOGICAL.

**INTERESTING DISCOVERIES IN A NORFOLK CHURCH.**—During the restoration (just completed) of the parish-church of Horsham St. Faith's, about five miles from Norwich, the old screen, which had been painted over in white, had its panels freed from the modern coatings of paint, and the result has been the discovery of ten panels, containing various saints. Amongst others may be mentioned St. Catherine of Sienna, St. Etheldreda, St. Oswald, St. Michael, and St. Apollonia. But the most interesting discovery, because of its rarity, was connected with the pulpit. This, which is of the same date as the screen (latter part of the fifteenth century) was also painted white, but Mr. Phipson, the architect in charge of the restoration, was strongly of opinion that under this the original paintings remained, and upon the careful removal of the white paint, ten most interesting figures were discovered, viz., St. Christopher with the Infant Jesus, St. John the Evangelist, with cup and serpent, St. Andrew, with cross and book, the Virgin Mary holding the Infant Jesus, with a monk below, in the attitude of prayer; St. John the Baptist, with the lamb and book and cross; St. Stephen holding stones in a napkin; a monk holding a crozier and book (probably St. Benedict), and another holding a crozier. The last is a female figure crowned, holding a saw in her left hand and a book in the right, but who this is intended to represent is doubtful. The execution of these figures, as well as those on the screen, is very good, some, however, being much better drawn and painted than others. They have been refixed just as they were discovered, without any retouching, and it now stands one of the most interesting and unique specimens of an early illuminated pulpit to be found in England. It should certainly be illustrated by one of the archæological societies.

**THE BELGIAN ACADEMY OF ARCHÆOLOGY.**—The subjects for competition selected by the Belgian Academy of Archæology are:—1. The history of the typographic establishment at Antwerp of Plantin and his successors. 2. The history of Romanesque sculpture in Belgium. 3. An archæological or historical paper relative to the ancient principality of Liège, the choice of subject being left to the writer. The papers are to be written in French, and, in addition to

the prize of 500 francs, the Academy will give a medal to each successful candidate, with fifty copies of his memoir.

## PARLIAMENTARY NOTES.

**BOW-STREET POLICE-COURT.**—Lord H. Lennox, on Monday, in reply to Mr. R. Gurney, said that for two years past the attention of the department over which he presided had been constantly called to the insufficient accommodation provided by Bow-street Police-court. It was true that a sum of money had been expended last year under the sanction of Parliament towards the purchase of a new site in Castle-street, Leicester-square. This year, however, owing to representations made by the Home Secretary, the department had resolved to look out for a site in another part of London which would be more convenient for carrying on the police duties of the metropolis.

**COMMISSIONERS OF WORKS AND PUBLIC BUILDINGS BILL.**—This bill went through committee in the House of Commons on Saturday.

**IRISH NATIONAL MONUMENTS.**—Mr. M. Henry, on Tuesday, asked the Chief Secretary for Ireland whether it was the intention of the Board of Works in Ireland to carry on the repairs of the national monuments for which funds had been vested in them under the 25th and 26th Sections of the Irish Church Act, without obtaining the assistance of an inspector specially skilled in the ancient architecture of Ireland? Sir. M. H. Beach said the Board of Works in Ireland considered their part confined to the preservation of these monuments rather than their restoration. If at any time an inspector's services were required they would be furnished.

**POLLUTION OF RIVERS.**—In answer to Dr. L. Playfair, Mr. Slater-Booth said that the Rivers Pollution Commission was appointed so long ago as 1865, and was reconstituted in 1868. Since then there had been five important and valuable reports from that Commission. The sixth and last report might be expected very soon. There had already been brought in a bill embodying some of their recommendations; and in course of the recess he intended to submit to the Government some further legislation based on the reports of that Commission.

**THE REGENT'S CANAL AND THE ZOOLOGICAL GARDENS.**—Mr. Forsyth asked the President of the Local Government Board whether his attention had been called to the polluted state of the water in the Regent's Canal, especially that portion of it in close proximity to the Zoological Gardens. And if it was the fact that the refuse of the animals in these gardens was emptied into the canal; and, if so, whether any action would be taken to prevent the same.—Mr. Slater-Booth said the matter had not been brought under the notice of the Local Government Board, but he had made inquiries on his own account, and had found that nothing but surface water from the Zoological Gardens was emptied into the Regent's Canal. This, he understood, had been examined, and had been found to be purer than the water of the canal itself.

**THE TRAFFIC BETWEEN HAMILTON-PLACE AND GROSVENOR-PLACE.**—Mr. Gordon (for Sir C. Russell) asked the First Commissioner of Works whether he was in a position to state the nature of the Government proposals to relieve the pressure of traffic between Hamilton-place and Grosvenor-place, and if the plans for such could be shown before the close of the Session. Lord H. Lennox said it would be his duty to ask the sanction of the House of Commons for a plan which would relieve the traffic in question. It would be in the nature of a road across the Park from Hamilton-place to Grosvenor-place, passing under Constitution-hill. The road would be 700ft. in length and 60ft. in width.—Sir J. Hogg asked whether the works would be carried out during the autumn, so as not to interfere with the traffic next year.—Lord H. Lennox said that it would depend upon the Treasury.

The Paris Pantheon is to have the history of its patroness, St. Genevieve, painted on its walls. M. Gérôme has declined the task, and M. Humbert replaces him for the pictures of the "Last Moments of the Saint" and "St. Clotilde placing her Husband's remains in the Tomb of Clovis." The dome will bear a painting by M. Matout of "Christ Showing the Angel of France in a Vision the Destiny of her People."



## Building Intelligence.

### CHURCHES AND CHAPELS.

**BELGRAVE.**—The opening services in connection with the Nonconformist Union Church, Belgrave, Leicester, was held last week. The church is planned to seat 400 adults on the ground floor and 100 adults in an end gallery. Under it is a schoolroom for 300 children, senior classrooms, and an elementary and infant classroom. The style of architecture is Early English Gothic, the material of the walling being red brick with Bath stone dressings. The total cost, including the ground, will be about £3,500. The architect was Mr. Tait, of Leicester, and the contractor Mr. Billington, of Belgrave. Mr. Barrett did the stonemasons' work, and Mr. Bramley the gas-fitting.

**HAVANT.**—The new (Roman) Catholic Church—to be dedicated to St. Joseph—in the course of construction at the west end of the town, is approaching completion. It consists of a nave and aisles 56ft. 6in. in length, the width of the nave and aisles being 18ft. and 9ft. respectively, and a chancel 18ft. 8in. in length by 17ft. 6in. wide. The presbytery is also being erected at the north-east end of the chancel. The walls of both church and presbytery are of flint, with stone dressings. The high altar is being executed by Messrs. Farmer and Brindley, and represents incidents in the life of St. Joseph carved in stone, with marble pillars, the tabernacle being in alabaster.

**HORSHAM ST. FAITH'S.**—The parish church of Horsham St. Faith's, near Norwich, was reopened last week, after restoration under the direction of Mr. Phipson, architect, Norwich. The church consists of a nave and north and south aisles, south porch, west tower, and chancel, which are all in the Perpendicular style. The arcade between the nave and north aisle had seven arches and piers, all formed in rough brickwork and plastered over. On the south side there were six similar arches, the porch occupying the place of the seventh. All these arches had gone over several inches from the upright, and were of very poor design. These have all been taken down, and arcades formed of rich and deeply-moulded stonework, and the clerestories rebuilt. The old oak roof has been carefully restored and strengthened by ties. The bells have been recast by Warner & Son, and rehung by Mr. Crane, of Horsham. The passages have been paved with Minton's tiles. The porch, which is a handsome flint and stone erection with a chamber over it, has been restored in all respects like the original work, and a staircase of open stonework made in the south aisle to reach the parvise, which is to be used as a vestry. The benching is of oak, with poppy-head ends. The old screen, which had been painted over in white, has had its panels freed from the modern coatings of paint, and the result has been the discovery of ten panels containing various saints. A further account of these discoveries is given under the heading "Archæological." The whole of the works have been executed by Mr. Robinson Cornish, builder, of North Walsham, from the designs and under the superintendence of Mr. Phipson. The cost was about £3,000.

**LIVERPOOL.**—The synagogue of the Liverpool New Hebrew Congregation, in Hope-place, Liverpool, has been undergoing considerable internal improvements. The vestibule has been rearranged, and about 60 sittings have been added to the hitherto insufficient accommodation. The synagogue has been thoroughly repainted. The decorations have been entrusted to Messrs. Jelley and Hughes. The principal tint in the decoration of the ceiling is atmospheric grey, intermixed with gold, blue, and other colours. The pillars of the ark are painted in imitation of green marble, with black and gold bases and grey capitals. On each side of the ark is a stained glass window, having on either side pilasters in imitation of Siena marble, whilst over the windows and ark are three arches of the colour of white and grey marble. The woodwork alterations were carried out by Mr. R. Tiffin.

**NEWTOWN.**—St. David's Church, Newtown, Montgomeryshire, was reopened on Thursday last, after restoration, at a cost of £2,250, under the superintendence of Mr. D. Walker, architect, of Liverpool. Mr. E. Williams, of Newtown, was

the builder. The additions consist of a new chancel; organ-chamber, vestry and south porch. They are in the Thirteenth Century style. The materials used in the works externally are yellow bricks, of Ruabon manufacture, the outside freestone works being restricted to the tracery of the windows, pinnacles, cills, and copings, and carved work not capable of execution in brick. The new works internally are lined with freestone ashlar to a height of 10ft., and finished above in Keene's cement for wall figure painting, when funds will allow. Sitting accommodation is now provided for 800 persons.

**ROTHERHITHE.**—The old parish-church of Rotherhithe having fallen into much decay of late years, owing to neglect, a committee has been appointed to carry out the necessary repairs and improvements. Last week the executive committee had submitted to them plans of the proposed works, by Mr. Butterfield, which were approved. The cost of the proposed works will be £1,200.

**SUTTON.**—A new chapel was opened last week in connection with the South Metropolitan District (pauper) Schools, Sutton. The building is a spacious edifice in the Gothic style, the seats and roof being of stained pine, and the iron columns and girders painted blue. It has a gallery running round three sides, and accommodation for 1,200 children is provided. The architect is Mr. Morland, of Greenwich, and the builder Mr. Hart, of Dover-road, the amount of whose contract was £3,500, including the erection of new infant-schools.

**WHITEGATE.**—The parish-church of Whitegate, near Vale Royal, the seat of Lord Delamere, is undergoing restoration. The old church externally was a plain brick building; internally, divided into nave and side aisles by means of wooden pillars, which, with the roof timbers, remain in the new building. In the new work it is intended to re-use as much as possible of the old walling, which is of bricks of a small size. On the south side there will be a new porch, constructed of oak. Adjoining this, at the west end, is the vestry, which is altogether new. The chancel, which will be considerably longer than the old one, will be altogether new. The gable of the east end, above the chancel window, is constructed of oak, filled in with nogging work, and the upright pieces being panelled and traceried, and the beams and verge-boards carved. This will harmonise with the timber construction of the interior of the church. The design of the new work is of a late Gothic character, and the whole is being carried out by Mr. Richard Beckett, of Hartford, from the plans and under the superintendence of Mr. John Douglas, architect, Chester. The estimated cost of the work is £1,600.

### BUILDINGS.

**LEWISHAM.**—The first stone of new offices for the Lewisham District Board of Works was laid last week at Catford. Mr. Elkington, a former member of the Board, is the architect, and the builders are Messrs. Hill, Higgs, and Hill, the amount of whose tender was £9,784, the total cost of the buildings, including land, furniture, &c., being £12,000. The offices will comprise a handsome boardroom, 46ft. by 30ft., committee-rooms, clerks' and assistants' offices, &c. The building will be surmounted by a clock tower.

**STIRLING.**—The Smith Institute, Stirling, N.B., has been opened. The building is in the Italian style of architecture, from designs by Mr. Lessells, architect, Edinburgh. The building, which is somewhat similar in appearance to the National Gallery, Edinburgh, has in front a portico with Doric pillars. The accommodation it affords includes a grand picture gallery, 105ft. by 43ft.; a smaller gallery 43ft. by 27ft.; two museums, the larger 148ft. by 30ft., and the smaller 44ft. by 24ft.; a library and reading-room 50ft. by 28ft.; and a council-room and other necessary offices. The library is handsomely decorated, the ceiling being panelled and filled in with plaster of Paris casts of famous Stirling heads, alternated with appropriate shields and coats of arms.

New Board Schools in Hawley Crescent, Cunden Town, were opened on Saturday. The building, which accommodates 750 children, has been erected from designs by Mr. E. R. Robson.

Thirsk parish-church is about to be restored by Mr. G. E. Street, R.A.

### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

To OUR READERS.—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces. All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVEN-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

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STUDENT.—Your query is of too vague a character. H. H. R., Pendleton.—Though no doubt possessing local interest, the matter you write about does not possess sufficient general interest for our pages. THE BUILDING NEWS is a general paper, and is read wherever there is a community of men who speak the English tongue. Mr. E. W. Pugin, on his return from an extensive tour in the United States of America, told us that whenever he went either to reading-rooms or architects' offices, he was almost sure to see the BUILDING NEWS. H. H. R. will therefore excuse us for not inserting his letter, which could only be interesting to one of the Manchester suburbs.

H. GILMORE calls our attention to the fact that a London professional paper last week reproduced the whole of Mr. E. W. Godwin's article on the Decoration of St. Paul's from *Fraser's Magazine* BEFORE *Fraser* was published, and he wants to know the reason. We cannot tell him beyond this—that we have reason to believe that the article from *Fraser* was obtained in some underhand manner, for which the offending paper has been called to account. An explanation having been demanded, no doubt an apology will be offered. It is permissible for weekly papers to take extracts from articles in the month's magazines, but this is the only instance we know of where an article was unscrupulously appropriated bodily. H. Gilmore will see that we have given a lengthy notice of Mr. Godwin's article in another part of this impression of the BUILDING NEWS.

A MEMBER of the Architectural Association, in a letter says:—"You are deserving the thanks of the whole architectural community for the manner in which you spoke in your last number of Mr. Sharpe's policy of educating young architects. If we had three or four more Edmund Sharpes, architectural ideas and purposes would be less cloudy and confused than they are at the present moment."

## Correspondence.

### BUILDING STONES IN SMOKY TOWNS.

(To the Editor of the BUILDING NEWS.)

SIR,—Mr. Trickett says in his letter in your issue of last week that he has erected a plain building of granite, and that the cost is 30 per cent. extra on a freestone building. He does not, however, give any description of the freestone building, without which it is impossible to judge of the fairness of the comparison. After this loose statement he complacently remarks that "facts are stubborn things." Mere assertions in technical matters, however, are not facts, and before they are raised to that dignity require to be fully proved and tried. If they bear the trial, they receive general acceptance, and then become facts, stubborn or otherwise. If Mr. Trickett wishes to give facts, or even useful information, I beg to ask him to be good enough to say where the granite building is, what the granite work cost, how much the building complete, and with what freestone building he made the comparison.



In the absence of this information, I conclude that the 30 per cent. is the difference between the stone and granite only, and not the extra cost of granite on the building in bulk, which is the way any commercial man would look at the question.

I may here say, however, that in writing on this subject I have always urged the substitution of granite for freestone only for the most important national or more costly private buildings in London, on which it is usual to incur a large outlay on external decoration in freestone. With such buildings I am convinced that granite work may be made to compare most favourably, both for beauty and economy. Considering the everlasting character of the work, the trifling extra expenditure would be the truest economy, as no reasonable person can deny, when he remembers that scarcely an original external stone exists of the glorious Abbey, of Henry the Seventh's Chapel, or the Temple Church, and, as I showed in my last letter, that the decay of modern freestone buildings is acknowledged and lamented by those whose opinion on the subject is of most value.

In venturing to urge this reform in the external construction of our buildings I have no pecuniary interest whatever, and do so only because I think it is a thousand pities that the beautiful work of our architects should be executed in such perishable material as freestone is in the London atmosphere. Mr. Trickett seems still determined to deny the durability of granite, though he can only produce one example of decay. Although confining myself to London structures built more than 25 years ago, I was able to name half a dozen in a perfect state of preservation. If he will step into the British Museum he will see specimens a few thousand years old. If he will look at the Eddystone Lighthouse, he will see granite that has withstood the storms of the Atlantic for nearly 100 years. Let him look at the Duke of York or Nelson columns, and think whether additional beauty would not have been added to our glorious but soot-begrimed St. Paul's if it had been built of the same material. If he will, then, consider the entire confidence such scientific men as Smeaton, Rennie, Bazalgette, and others had in the material, I think he will scarcely any longer deny that it possesses the important quality of durability—the one quality wanting in the material of our London buildings. Its cleanliness, I think, undeniable; but this is altogether a very secondary question.—I am, Sir, your obedient servant, H. T.

Upper Sydenham, 4th Aug., 1874.

#### PROPOSED RESTORATION OF ST. LUKE'S, CHELSEA.

SIR,—I am incited to address you on the above subject by the publication by a local journal, of a letter written (with that view presumably) by a "Resident of Chelsea" to the rector of the parish. The announcement having been made that it was intended to renovate the building, and that funds were, or soon would be, at hand for the purpose, has set one of the cognoscenti to work in an archaeological direction, and I will quote his own words just to show the kind of Slough of Despond in which an architect would find himself struggling, did such *savants* have a voice in the direction of the work on which he might be engaged.

After stating that the long-looked-for restoration of the interior of the church is the sole cause of his having resided up to the present time in the parish, he asks for information on the following items:—

"1st. Is it intended to remove the organ from its present commanding position?"

"2nd. Is it intended to remove or alter these three magnificent (sic) chandeliers now suspended in the nave, and put some other mode of lighting?"

"3rd. Is it intended to remove the present pews and put open benches in place thereof?"

"4th. Is it intended to remove and alter the present position of the pulpit?"

And then comes the appalling threat that should any of these "innovations" be contemplated, he will withdraw his patronage altogether. I should say "So much the better for the concern."

For the benefit of those among your readers who may not be familiar with the present arrangement of St. Luke's, I will say that the "commanding position" of the organ is in a west gallery, whence its tones reach the ears of the congregation about half a bar later than those of the choir do, the latter being at the other extremity of the building. The "three magnificent chandeliers" are of the theatrical type, and with ground-glass globes; the whole of the light is lost among the tracery of the vaulting, and the people left below in obscurity. True, in the aisles, under the galleries, there is more light, but then this proceeds from exactly the kind of burner to which the "Resident" takes exception.

The existing "pews" are certainly less objectionable than many of the same class, the doors always excepted, the opening and shutting of which is, of course, naturally disturbing.

The pulpit is a "three-decker," this is accounted for by the existence of side galleries, but its "position" is on the south side of nave, the north side being occupied by a monstrous reading-desk and clerk's desk, about the retention of which, by the way, the "Resident" is silent.

It is positively marvellous to see with what strong prejudices people will cling to these old Classic dodges, and when any effort is made by a member of the profession to alter, or at least modify them, I' faith he is scouted as an "Innovator."

This valiant *Chelsea-ite*, then, as a warning to all such as do take and restore themselves their churches, holds up as an example of "disfigurement" the late very successful additions to St. Peter's, Eaton-square, which he states "are in the style of Byzantine" (sic) "from St. Mark's, Venice," and later on "was decided by the character of the Church of Rome," whatever that may be. This is, of course, calculated to stir up his readers to rise as one man and quell the "Innovators" at all costs.

I heartily hope that the restoring architect of St. Luke's (whoever he may be), will have the pluck to carry out his "innovations" to the full, despite the criticism of would-be participators in the task, and then, perhaps, the church being more in accordance with modern views and requirements, may stand some chance of winning back many members of its congregation who have been obliged to seek art and architecture at some of the more advanced churches in the locality.—I am, sir, &c.,

5th August, 1874;

Q. Z. Z.

[Our correspondent only answers a portion of the letter which appeared in a local organ. That letter referred to the recent "restoration" of St. Paul's, Covent-garden, a restoration which many thought a degradation at the time. Strange to say, almost immediately after the removal of the late rector the question became reargued as to the best means of obliterating, if possible, the "restoration" effected under his auspices. Possibly St. Luke's, Chelsea, is doomed to a similar "restoration." If so, in all probability a similar reaction will take place as is seen in connection with St. Paul's, Covent-garden.—ED.]

#### THE GROCERS' COMPANY MIDDLE CLASS SCHOOL COMPETITION.

SIR,—I was much interested, as no doubt others concerned must have been, in your remarks on this competition. One would have expected, in submitting designs to the Court of the Grocers' Company, that the combined energies of forty-six competitors would have been more respected, and not treated with that reticence which seems to have pervaded the whole affair. The general conditions seemed all that could be desired by competitors, especially as they clearly stated that the opinion of a professional architect would be taken upon the merits of the plans. If the Court did really intend to obtain that opinion, it certainly seems very strange that no report of the referee has been forthcoming, or his name even mentioned. I have good reason to believe that Mr. Gwilt has been the professional architect referred to. I have no knowledge of Mr. Gwilt's qualification to judge of the merits of designs for such an important building, but I did not for one moment suppose that one so interested in the affairs of the Company would be selected as a referee, neither do I think it fair that he should have been. The designs, taken collectively, were not what one might have expected in such a competition. There were, however, at least twenty sets well worth criticism by the Press, and it was a "shame," as my friend who accompanied me, said, to see the jumbled state of the drawings for even the competitors to look at. Nothing can give greater satisfaction to competitors to find that they are consideredately treated, and that an opportunity for criticism by the Press be liberally afforded.—I am, Sir, &c., A COMPETITOR.

## Intercommunication.

### QUESTIONS.

[3406.]—**Architect's Powers.**—Having read with great interest the discussion raised by "Gus" in Intercommunication, I would be thankful to any of your readers who would give me advice in the following:—Having had the contract in extensively restoring a church, the architect gave the vicar a guarantee that the cost should not exceed a certain sum: the conditions stated the architect was to have power over all work in contract, and extras. He met me as contractor, and arranged the accounts, and gave a certificate on account; this the vicar refused to cash, and asked the architect to furnish a statement, which he did, showing that not only this, but a much larger amount, was due; but, strangely enough, now alters his own figures, I suppose to meet the guarantee given to the vicar; he also makes an affidavit that all was paid he had certified for. In a statement now given he makes deductions for what is never specified, and through the whole account a large number of items are composed of dimensions—12in. x 12in. x 9in. he gives all those with the same cube and superficial contents. His final statement to me is without his signature, and on my asking for explanations, he refers me to the vicar's solicitor. Can any of your readers inform me, in face of those glaring inaccuracies, if, in a Court of Equity, he will be able to sustain his sole power over all matters?—JUSTICE.

[3407.]—**Whiting Clay.**—Can any of your readers inform a brother-subscriber how to make Dorsetshire two-ball clay turn white? I am a cement manufacturer, and my principal material is this clay, which I dry on the top of my boiler, and then grind up with millstones, but the clay still retains a dark grey colour. I want the clay white, and should be very thankful for the assistance of your readers how best to turn it so.—J. BATESON, Lancashire.

[3408.]—**Drying Clay.**—Can any of your readers inform me how best to dry forty tons of wet clay per week for the purpose of grinding up into powder as fine as flour.—J. B., Lancashire.

[3409.]—**Simple Pantograph.**—Can any of your readers supply an illustration of the "Very simple Pantograph," as suggested by Schnaus, which is mentioned in query in last impression. It is difficult to understand the descriptive paragraph without the aid of an illustrative sketch.—W. B. (Curate).

[3410.]—**Taking out Quantities.**—Will you, or any of your readers, answer through Intercommunication what is the usual practice in the following case?—In a limited competition for the erection of a block of buildings the following notice is attached to the specification, and was read by all the persons tendering:—"Whosoever's tenders are accepted will have to pay Mr. —, on signing the contract, or at the completion of the work, the sum of two per cent. upon the total value of such tender, and as being his professional charges for taking out and calculating the quantities of work and preparing the schedules." Each tradesman got a copy of the quantities, and I was instructed to accept certain tenders on behalf of my client. All have signed contract, &c., excepting one, who has had repeated interviews with me on the subject of his tender, but put off from time to time signing contract, &c., and at last informed my client that he would not proceed with the work he had tendered for. My client is doing the work himself, employing workmen, &c., but has relet a portion of the work to another contractor. Can the person whose tender was accepted, as stated, be compelled to pay the two per cent. for quantities? It must be understood that all the labour in taking out these quantities, in consequence of this man not signing the contract, is labour thrown away, arising from no fault whatever on the part of the architect.—NEMO.

[3411.]—**Queen Anne's Style.**—Can one of your correspondents give a complete list of some of the best old examples about London of the style of Queen Anne?—G. R.

[3412.]—**Selenitic Mortar and Concrete.**—I should like to know the difference in actual strength between selenitic cement and Portland; also difference of cost, and whether any system of block concrete building has been adopted about London? I do not mean the filling-in processes as Tall's and Drake's.—ARISTO.

[3413.]—**Mr. Burges's Model of St. Paul's.**—Will some one be good enough to inform me whether Mr. Burges's model, which exhibits his scheme for decorating St. Paul's Cathedral, can be seen at any public place in London, now the Academy is closed, as I should like to see it when I go to London, and most likely others, who have been unable to visit the Academy exhibition, would like to do so.—A COUNTRY ARCHITECT.

[3414.]—**Cast Iron.**—Can any one inform me, of your numerous correspondents, where I can obtain particulars of any mechanical improvements in moulding cast-iron work, core making, &c.?—O. P. Q.

### REPLIES.

[3386.]—**Liabilities of Architects.**—It appears to me the client's remedy is against the builder. "B." imagines, from what he says, that there is no clause usually inserted in building agreements to the effect that no certificate of completion shall release the builder from doing what he contracted to do. Now such a clause I have invariably inserted in my agreements, and I know other architects who do so. I think a builder is both legally and morally bound to make good any defect, either of material or workmanship, which happens to have escaped the architect's notice—i.e., if such material or workmanship has been specified within or implied by the contract.—G.

[3399.]—**Pressure on Sluice Valve.**—In answer to "R. J. G. R." the height from top of water in cistern to sluice-valve is 530ft., the length of 9in. main C is only about 3ft., so that it will be sufficient to consider it as a 9in. orifice immediately in front of the 27in. valve.—R. L.

[3402.]—**Asphalte for Alley.**—I should advise "Claridge's," or the "Limmer" asphalte, laid on a bed of concrete.—H.

[3404.]—**Surveying Hilly Ground.**—In surveying hilly ground the horizontal area must always be returned, except for paving, reaping, &c., in which cases the hypothenusal measure must be given, to obtain which it is necessary to divide a hill into various figures. The Ordnance maps show the horizontal area, not the actual distances gone over. I would recommend "Live and Learn" to consult a work on surveying, by T. Baker, C.E., published by Lockwood and Co., or Nesbit's "Surveying," in either of which he will find tables showing the reduction in links upon 100 links for every half degree of inclination, and other useful information.—J. H. S.



[3404.]-**Surveying Hilly Ground.**-In surveying hilly ground it is the custom to take it as horizontal, and there are two methods for having the horizontal base of the inclination; one, holding up one end of the chain so that it may level; or, secondly, measuring the length of the slope, and then finding out what angle it make with the horizontal, afterwards deducting so much per degree from each chain length. There is a table in Lockwood's "Architect and Surveyor's Pocket-book" showing how much is the deduction for every degree.-SURVEYOR.

[3404.]-**Surveying Hilly Ground.**-In reply to "Live and Learn," only the horizontal or area of base occupied by hilly ground is taken into account, as it would be manifestly wrong to take the slope or hypotenusal line instead of the horizontal. Although the sloped surface is greater, the practical surface is not so; and this may be proved by the fact that no more trees can be grown on a hill-side than on the horizontal base of it; and not only trees, but the argument applies to buildings as well. Ordnance surveys only compute the horizontal areas, for the reasons above stated.-H.

#### WATER SUPPLY AND SANITARY MATTERS.

**MARKET RASEN.**-Plans of united drainage works, prepared by Mr. John Addy, for the parishes of Market and Middle Raseen, were submitted for inspection at a meeting of the Calstow Rural Sanitary Authority held on 25th ult., and ordered to be sent at once to Whitehall for approval of the Local Government Board. The estimated cost of the works was put down at £4,528. 18s., exclusive of any sum for land which it might be determined upon to purchase for purposes of irrigation. The point of discharge for the sewage, as shown on the plan, was conveniently placed either for a tank or irrigation.

**SWAFFHAM.**-Mr. J. Baker, of Lynn, has been appointed engineer to the Swaffham Waterworks Company. There were several applicants for the office.

**THAMES VALLEY DRAINAGE.**-Recently a deputation, consisting of representatives of Kingston-on-Thames, Surbiton Improvement Commission, and the Hampton Wick Local Board, were introduced to the President of the Local Government Board, with the view of getting the Government to take some steps to relieve places in the valley of the Thames of the difficulties of dealing with their sewage. They pointed out that under the Towns Improvements Act they had been compelled to deal with their sewage; that sewage irrigation had been recommended, and large sums of money had been spent; but owing to the difficulty of obtaining land-the land in the neighbourhood being building land and public park land, they could not obtain effluent water of the standard required by the Thames Conservancy for allowing it to flow into the Thames. They were now under a penalty of £100 per day, and but for the forbearance of the Thames Conservators, who were waiting for something to be done, it might be a still more serious pecuniary matter. What they wanted was a commission to be issued by the Government, to report on a scheme of a comprehensive character, and make a compulsory union of the different bodies to carry out a proper scheme of drainage. The President, in reply, said he fully appreciated the difficulties they were in, but at the same time the remedies they suggested were of a large character, and he could not answer them on the spur of the moment. When they spoke of a commission inquiring into a scheme of drainage for the places they represented, the question would immediately arise, why should not the same commission include the whole valley of the Thames, at any rate to Windsor? There were many other places, such as Hounslow, Isleworth, and Brentford, in the same difficulty; and if they had to wait until the commission reported on all these places the delay might be very serious. He asked why they had not taken advantage of the provision in the Public Health Act of forming themselves into a sanitary district? That would be much better than waiting for the report of a commission on the whole Thames valley, which, after all, might not be of any practical value.

**THE KIRKINTILLOCH AND LENZIE WATERWORKS.**-The Kirkintilloch and Lenzie Waterworks were opened on Tuesday. The works in connection with the scheme include the construction of a fireclay aqueduct, the diversion of hill streams, and the formation of inlet wells for receiving these and the water of the Woodburn, a storage tank of 180,000 galls. effective capacity, and valve well. The drainage area of the Drumalrn basin, in which the supply is collected, is estimated at about 300 acres of trap country. The cost of the scheme complete is about £2 per head for a population of 7,000. The whole of the works have been designed by and carried out under the instructions of Messrs. Storry and Smith, C.E., 4, West Regent-street, Glasgow, the contractors being Messrs. D. Y. Stewart and Co. and Mr. J. A. King.

**USING SEWAGE GAS FOR ILLUMINATING PURPOSES.**-Mr. Andrew Bray, at present in America, has invented and patented an illuminating gas which, according to a Manchester paper, seems likely to do much towards supplying a purer and cheaper light than that of the ordinary coal gas. The source from which the gas is obtained is sewage water, one quart of which will yield 47ft. of the gas. Three retorts are fixed in a furnace, and when they are sufficiently heated the liquid is passed through two of them, through an iron cylinder called the hydraulic main,

which is elevated above the furnace, through the third retort, and then through a coil of metal piping immersed in cold water. Afterwards the processes resemble those employed in making coal gas. It is claimed that the illuminating power of the new gas is treble that of the gas at present used in our streets, manufactories, and houses. For instance, a No. 1 burner consumes one foot of coal gas an hour, while a No. 3 consumes three feet; but when the new gas is used a No. 1 burner will give as much light as a No. 3 through which coal gas is consumed. The new light is said to be clearer than ordinary gas, more like daylight in appearance, and more healthy, because it is free from tar and sulphur, and cannot give off any waste carbon. As regards cost, it is stated that, while ordinary gas cannot be produced under any conditions for less than a shilling per thousand feet, the same quantity of the new gas may be manufactured, even in a small way, for less than a shilling. One of the reasons of this reduced cost is that only about twelve men would be required in making the new gas, against at least 100 who are needed under the present system. In the manufacture of ordinary gas a good many men are necessary to keep up the supply of coal to the retorts, and to remove that which has been burnt into coke; but this work does not form part of the process of making the sewage gas.

#### LEGAL INTELLIGENCE.

**ACTION BY A COUNTRY BUILDER.**-In the Cirencester County Court the other week, Mr. W. H. James, builder, of Cirencester, sued Wm. Hamilton Yatman, Esq., of Highgrove House, near Tetbury, for taking out quantities, and making a detailed estimate for some proposed buildings. The plaintiff's counsel, in opening the case, said the original claim was for £62. 16s. 6d., but this was reduced to £50, so as to be tried in this court. Mr. Yatman being desirous of making some additions to his house, employed Mr. Thomas, clerk of works of Westonbirt, to make plans and specification, and Mr. James was asked to make a detailed estimate of the cost; for this purpose he had to make out a schedule of quantities, to affix the prices, and to money out the items. As no regular architect was employed, and as Mr. Thomas was in the employ of Mr. Holford, considerable delay took place in the completion of the plans, which were not all delivered to Mr. James at the time he was instructed to commence his estimate, and which delay caused several journeys and many alterations in the quantities. The amount of the estimate being more than Mr. Yatman had anticipated, Mr. James suggested numerous alterations to lessen the expense, and it was decided to have a new set of plans and specification, and to abandon the first set. Subsequently the work was tendered for by several builders in competition. Mr. James claimed 2½ per cent. on the amount of his first estimate, as well as his travelling expenses to Highgrove and Westonbirt on several occasions. The judge, after hearing evidence on both sides, said he thought the balance thereof was in favour of 1½ per cent. for quantities in the country, and half per cent. for pricing-making 2 per cent. There was a little doubt in his mind as to the travelling expenses, but as this was an exceptional case, he thought he must consider them as included in the percentage, and therefore gave a verdict of £40 for plaintiff.

**HISTORIC GROUND.**-Recently, at the Ship Hotel, Greenwich, a special jury was summoned to assess the value of a piece of land about six acres in extent, the property of W. J. Evelyn, Esq., the defendants being the East London Railway Company. The plaintiff claimed £52,000. It appeared that the ground sought to be taken possessed great historic value, having been in the family's possession since the sixteenth century, and was remarkable for its being the place where Sir Walter Raleigh doffed his mantle for Queen Elizabeth to walk upon, and traditionally the rendezvous much frequented by Peter the Great. It originally belonged to John Evelyn, the celebrated author, and now in its entirety produced a rental of £17,386 per annum. The property has been laid out for buildings and other purposes with considerable advantage by the present claimant, and the value of land in Deptford had increased in a marvellous manner, there being scarcely a house vacant. The land now sought to be acquired is intersected by the North Kent and Greenwich lines, and it was stated that the company, taking the ground they had, communication of one part of the estate with the other would be cut off, and its value consequently reduced. In 1873 the Board of Trade appointed a surveyor to value the land, and the amount of his valuation was £16,987. 10s. This sum the claimant thought much too small, and set up a claim for £52,000, agreeing, however, to lessen it if the company would erect a station on the proposed site. They refused to do this, and under the 85th section of the Lands Clauses Act compulsorily took possession of the land, paying into court the sum of £16,000 to cover all demands. After the jury had viewed the property a short consultation between the parties ensued, whereupon it was agreed to take a verdict by consent for £17,000.

**WATER COMPANIES AND THE WATERING OF GARDENS.**-A case was brought before the Clerkenwell County Court, a few days ago, for the purpose of trying the right of water companies to make an extra charge for the water used for irrigating gardens over and above the rate charged for the water used for domestic purposes. The action was brought by a Mr. Thomas, residing in Highbury-crescent, against the New River Company, to recover the sum of 4s. charged to and paid by him for water employed in watering

his garden. The plaintiff was rated at £115, and paid a water rate of £6. 4s., but the New River Company, finding that he used part of the water supplied him on his garden, made an extra charge of 8s. a year. The plaintiff paid the first half-year demanded, under protest, he being threatened that if he did not pay it the supply would be cut off. The plaintiff was examined as to the facts, but this was merely a formal proceeding, as the facts were not disputed. The whole case turned on the construction of the New River Company's Act, 15th and 16th Vict., cap. 160, and the meaning of the words "domestic purposes." The two sections of this Act relied on by both parties were the 35th and 38th. The former section fixes the rate at which occupiers shall be assessed for the supply of water for "domestic purposes," and the latter explains "that a supply of water for domestic purposes shall not include a supply of water for steam engines or railway purposes, or for warming or ventilating purposes or for working any machine or apparatus, or for baths, horses, cattle, or for washing carriages, or for gardens, fountains, or ornamental purposes, or for flushing sewers or drains, or for any trade or manufacture or business requiring an extra supply of water." Mr. Carpenter, of Brabant-court, appeared for the plaintiff; and Mr. Poland for the defendants. The learned judge (Mr. Whitbread) held that the tenant was not justified in using the water for his garden without making an extra payment to the company for it, and therefore gave judgment for the defendants. The plaintiff having said his garden consisted only of 140 square yards of grass lawn, with ornamental borders, the learned judge said the size of the garden did not make any difference. No costs were asked for.

#### Our Office Table.

**THE MARGATE DRAINAGE COMPETITION.**-At the meeting of the Council on Tuesday week, Sir Joseph Bazalgette's report on the drainage plans was read. Sir Joseph entered at some length into the merits of two of the schemes-those signed "Economy" and "C. E."-but suggested certain alterations in both schemes. He expressed the opinion that the drainage would cost £35,000. The report was referred to a committee to report upon.

**THE VICTORIA EMBANKMENT.**-Several weeks back one of the metropolitan magistrates sent some boys to prison for wilfully breaking the cast-iron railings which divide the ornamental grounds from the Victoria Embankment. The punishment then awarded does not seem to have stopped the demolition of the railings, and but for the fact that the ratepayers will suffer, their speedy disappearance may be rejoiced at. We protested against their flimsy appearance at the time of their erection, and advised the substitution of a good honest wrought iron railing, something like that erected by the Templars to fence their gardens from the Embankment. By the way, the Metropolitan Railway Co. is allowed to do with impunity that which brought down imprisonment on the unfortunate street arabs. About one hundred yards west of Waterloo Bridge a ventilating shaft is open, and the steam and gases escaping through this are making short work of the railings which surround the top of the well. We recently gathered off the stone-work several ounces of the debris of the iron-work caused by oxidation.

**THE JOINERS' COMPANY'S PRIZES.**-At a meeting of this Company, held last week, the prizes offered by the Company in furtherance of technical education were presented. For Building Construction, J. H. Nixon, of the City of London College, was awarded the second prize of three guineas. For the first prize, of five guineas, no design was considered worthy. An extra prize was awarded to E. Pentelow, of South Kensington Schools of Art, for the care and trouble bestowed on his drawings. For wood-carving, J. P. Browne, of the National Art Schools, South Kensington, was awarded the five guinea prize. For designs for wood-carving, and also for ceilings, no prizes were awarded, there being so few competitors.

**PROPOSED DECORATION OF GUILDHALL.**-The Court of Common Council last week adopted the following resolution, on the motion of Mr. J. Edmeston: "That the architect be instructed to prepare and submit for the approval of the Court a complete design for the polychromatic decoration of one bay of the wall-surface and roof of the Guildhall, drawn to a large scale, in order that such design may be agreed to, so that the decoration done from time to time, when the hall is prepared for great occasions, shall be part of a well-considered whole, and not, as at present, a fragmentary effort.



**A NEW EXPLOSIVE SUBSTANCE.**—Captain Bjorkmann, of Stockholm, has (according to *Annales Industrielles*) compounded a new explosive substance, which he calls "vigorite," possessing a greater power, as it appears, than any of the other similar substances, such as dynamite and lithofracteur. In this case, as in that of the substances named, nitro-glycerine is the base of the matter which gives rise to the explosion, but it is mixed with others, which prevent the explosion from taking place so readily, and which therefore render the use of the vigorite less dangerous.

**MILNER'S SAFE COMPANY, LIMITED.**—A company is being formed to take over the business of Messrs. Thomas Milner and Son, hold-fast fire-resisting safe manufacturers, of Liverpool, Manchester, London, &c. The present change in the constitution of the business is necessitated by the declining health of the head of the firm, and the growing responsibility attached to a large and increasing trade. The business of Messrs. Thomas Milner and Son has been successfully carried on for nearly a century, and the safes have an established reputation throughout the commercial world. The capital of the company is fixed at £150,000, in 15,000 shares of £10 each. The purchase-money is £155,452. 7s. 8d., in addition to £30,236. 10s. 6d., the cost price of the stocks in the hands of agents. The vendors will take in part payment of the purchase-money, £35,000 in the fully paid-up shares of the company, and £60,000 debentures at 6 per cent., redeemable over a period of 30 years, from 1st day of June, 1879.

**THE LAST OF TEMPLE BAR.**—The gates of Temple Bar are gone, and the structure itself will speedily be removed, the Corporation having given orders for its demolition on Wednesday. The work has been entrusted to Messrs. Browne and Robinson, of Finsbury. We do not know whether the preservation of the Bar is contemplated by the Corporation; but should such be the case, no better site for its re-erection could, we should think, be found than at the end of the lane leading through the Temple on to the Embankment. A thoroughfare from Fleet-street to the same time, be opened out, to the very great advantage of the public.

#### CHIPS.

The additions which have been made to Holy Trinity Church, Llandudno, were consecrated on Wednesday week. The new portions of the edifice include two transepts, a chancel, and vestry, and the works have been carried out by Mr. Abel Roberts, from the designs of Mr. Felton, architect, Llandudno. The outlay upon the additions brings the total cost of the works to nearly £7,000.

The Hop and Malt Exchange, Southwark, was sold on Thursday week for £77,800. The buildings occupy a ground area of 26,000ft., the elevation being 95ft. and the street frontage 350ft. the total floor area being 221,169ft. The original cost of the ground on which the buildings stand was £60,000, and the erection of the premises cost £76,000, so that the price given for the whole was but little more than the original cost of the building alone, or about £3 per foot for the ground, including the premises erected upon it.

On Monday, the Mayor of Leicester (Mr. W. Kempson) laid with Masonic honours the memorial stone of the municipal buildings which are now in course of erection at Leicester, and which are to cost £30,000.

The foundation-stone of a new mission church at Buckby Wharf, Northamptonshire, was laid on Wednesday week. The church, which is to cost £500, will be in the Early English style, built of red brick with Bath stone dressings, and internally of red brick, with black brick and Bath stone bandings at intervals. It is to seat about two hundred persons. The architect and builder is Mr. Josiah Denny, of Buckby Wharf.

A small chapel, to seat about 300, designed by Mr. Thomas Oliver, architect, Newcastle-on-Tyne, is now in course of erection by the Wesleyan body of that town, as a memorial to the late Mr. Cuthbert Bainbridge, the four corner-stones of which were laid as separate foundation-stones a short time ago. The cost of the building will be about £3,000.

A most deplorable accident has just happened to Rabens's "Assumption of the Virgin," in the Gallery of Dusseldorf. This picture, of colossal dimensions, is painted on wood, and two cracks, one of them large enough to put the finger in, have made their appearance, and unfortunately one of them is right across the face of the Madonna. The misfortune is attributed to the late great heat.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHELVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB AND SON,  
Makers to the Bank of England,  
57, St. Paul's Church-yard, E.C.  
And 68, St. James's street, S.W.—[ADVT.] } London.

### The Timber Trade.

The wholesale prices of timbers, deals, &c., are as follows:—

	Per 120 12ft. 1½ by 11.	£	s.		£	s.
Archangel, 1st yellow,	3 by 9	17	10			
" 2nd "	2½ by 7	16	5			
Gothenburg, 1st yellow	2 by 5	11	10	"	11	15
" 1st & 2nd "	2½ by 7	13	10			
" " "	3 by 7	13	5			
" " "	4 by 9	15	0			
" 2nd "	2½ by 6½	11	15			
" " "	2 by 6	11	0	"	11	15
" 3rd "	2½ by 6½	11	0			
" " "	3 by 7	13	0	"	13	10
" " "	2½ by 7	13	0			
" 1st white	2 by 6	11	5			
Holmsund, 1st & 2d yel.	3 by 9	16	10			
" 3rd yellow	3 by 9	15	10			
" " "	3 by 7	14	10			
Wyburg, 1st yellow	3 by 9	15	0			
Alfresham, 1 and 2 yel.	3 by 9	15	0			
" 3rd "	3 by 9	14	0			
" " "	2½ by 7	13	10			
" 4th "	3 by 9	13	0			
Ljusne, 1st yellow	3 by 9	16	0			
" 3rd "	3 by 9	15	5	"	15	10
" 1st & 2nd yel.	3 by 9	15	0	"	16	0
" " "	3 by 8	14	10			
" 4th "	4 by 12	14	15	"	15	0
" " "	4 by 9	14	0			
Drontheim, 1st white	3 by 10	11	0			
" " "	3 by 9	11	0			
" 2nd "	3 by 9	10	10	"	10	15
Gefle, 1st & 2nd white,	3 by 9	12	15	"	13	0
" 3rd "	2½ by 7	11	15	"	12	0
" 4th "	2½ by 9	11	15			
" " "	3 by 9	11	0			
" 4th "	3 by 9	10	13			
Laurvig, 3rd white	3 by 9	10	15			
Memel, 2nd yellow	3 by 9	13	10			
Hudikswall, 2nd yellow	4 by 11	15	5			
" 2nd "	2½ by 10	15	5			
Husum, 1st & 2nd "	2 by 9	16	0			
Kotka, " "	3 by 9	15	5			
" " "	2½ by 7	14	10			
" " "	2 by 10	14	15			
" " "	2 by 9	14	10			
Onega, 2nd white	3 by 11	12	15	"	13	0
" 1st yellow	3 by 9	7	10			
" " "	2½ by 7	16	0			
Petersburgh, 1st white,	3 by 11	13	15			
" " "	3 by 9	13	5			
" 2nd white,	3 by 11	12	10			
" " "	3 by 9	11	10			
" 1st yellow	3 by 9	16	0	"	16	10
" 2nd "	2½ by 7	14	10	"	15	0
Swartwick, 1 & 2nd yel.	4 by 9	16	0			
" 3rd yellow	4 by 9	15	0			
" " "	2½ by 9	15	0			
" 4th "	3 by 9	13	10			
Stockaviken, 1 & 2 yel.	3 by 9	15	15	"	16	0
" 3rd yellow	3 by 9	15	0			
" " "	3 by 8	14	10			
" 4th yellow,	3 by 9	13	15	"	14	5
" " "	3 by 7	14	10	"	15	0
Sandarne, 1st & 2nd yel.	3 by 9	16	10			
" 3rd yellow	4 by 9	15	0			
Soderham, 1st & 2nd yel.	3 by 9	16	10			
Sundswall, 1st & 2nd yel.	3 by 9	15	15			
" 3rd yellow	3 by 9	15	10			
" " "	2½ by 7	14	0			
" 4th "	3 by 9	13	5			
Summas, 1st & 2nd yel.	3 by 9	16	5			
" " "	2½ by 7	15	0			
" 3rd yellow	3 by 9	14	10			
" " "	2½ by 7	13	10			
Sannesund, 2nd white	3 by 9	19	10			
" 3rd "	3 by 9	18	0			
Christiana, 1st "	3 by 9	23	10			
" 2nd "	3 by 9	22	0			

	Per 120 12ft. 2½ by 6½.	£	s.		£	s.
Dram, 1st yellow	2½ by 6½	11	10			
" 2nd "	2½ by 6½	11	5			
" 3rd "	2 by 4	9	0			
" 1st and 2nd white	2½ by 6½	11	0			
" 3rd "	2 by 4	9	0			
" " "	3 by 6½	9	10	"	9	15

Prepared Flooring per square.

	£	s.	d.		£	s.	d.
Christiana, 1st yellow	¾ by 7	13	0				
" 2nd "	1 by 7	12	6				
" " "	1½ by 7	17	0				
" 3rd "	1 by 6½	17	0				
" 1st white	¾ by 7	12	9	"	11	3	
" " "	¾ by 6½	12	6				
" 2nd "	¾ by 6½	12	3				

		s.	d.		s.	d.
Dram, 1st yellow	1 by 6½	14	0			
" 2nd "	1½ by 6½	17	6			
" 3rd "	1 by 7	13	6			
Fredrickstadt, 1st yel.	1 by 7	17	0			
" " "	¾ by 7	13	6			
" " "	¾ by 6½	13	0			
" 3rd yel.	1½ by 6½	17	0	"	17	6
" " "	1 by 7	14	0			
" " "	1½ by 6	17	0			
" " "	¾ by 7	12	6			
" 1st white	by 7	13	0			
Gothenburg, 1st yellow	by 6	12	6			
" 2nd "	1 by 7	14	0			
" " "	by 6	12	0			
Skien, 1st yellow	by 6½	13	0			
" Ditto, grooved, tongued, and beaded.						
Skien, 2nd yellow	by 7	11	0			
Frederickstadt, 1st yel.	by 6	12	6			
" " "	by 5½	12	0			
" " "	by 5	12	0			
" 1st wh.	by 7	12	9	"	13	0
Gothenburg, 1st yellow	by 7	10	6			
" 2nd "	1 by 7	14	0			

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#### TENDERS.

**ACTON, W.**—For new boys' and infants' schools, and alteration to present girls' school at All Saints, South Acton. Mr. Edward Monson, jun, architect.  
Jackson and Shaw ..... £1,900 0 0  
Cowland ..... 1,698 0 0  
Moxley and Rogers ..... 1,618 0 0  
Temple and Forster ..... 1,447 0 0  
Nye ..... 1,396 0 0  
Henning and Sons ..... 1,350 0 0  
Simpson and Baker ..... 1,301 0 0  
Blick (accepted) ..... 1,250 0 0

**ACTON, W.**—For alterations to shop in High-street, Mr. Edward Monson, jun, architect.  
Blick ..... £206 0 0  
Sydman ..... 266 0 0  
Simpson and Baker (accepted) ..... 178 0 0

**BEDFORD.**—For the erection of a new brewery, with offices and cellars, &c., for Messrs. Nash. Mr. George Scamell, architect, 18, Great George-street, Westminster. Quantities supplied by Messrs. Curtis and Son.  
Potter ..... £6,176 0 0  
Orchard ..... 3,900 0 0  
Porter ..... 3,835 0 0  
Carter ..... 3,700 0 0  
Day ..... 3,369 10 0  
Claridge ..... 3,254 0 0  
Foster (accepted) ..... 3,254 0 0

**BIRMINGHAM.**—For alterations and additions to Shirley vicarage. Mr. J. Meggett, Architect, Camden-street, Birmingham.  
Hardwick and Son (accepted) ..... £451 10 0  
**BIRMINGHAM.**—For the erection of a residence on the Blossom Field Estate, Solihull, for Mr. John Bonney. Mr. J. Meggett, architect, Camden-street, Birmingham.  
Lidzey (accepted) ..... £821 0 0

**BIRMINGHAM.**—For the erection of a new rolling mill, Sheepcote-street. Mr. J. Meggett, architect. Quantities supplied.  
Toft (accepted) ..... £945 0 0  
**BIRMINGHAM.**—For farm house, cottages, and other buildings proposed to be erected at Salfey. Quantities by Mr. J. Meggett, Camden-street, Birmingham.  
Brooks (lowest tender) ..... £1,500 0 0

**BLACKFRIARS.**—For police station, Bride-lane, Bridge-street, for Honourable the Corporation of the City of London. Mr. Horace Jones, architect. Quantities supplied by Mr. Wm. Reddall.  
Carter and Son ..... £10,770 0 0  
Kirk and Co. .... 10,400 0 0  
Ashley and Son ..... 10,180 0 0  
Holland and Hannen ..... 10,163 0 0  
Pritchard ..... 10,045 0 0  
Perry and Co. .... 9,976 0 0  
Conder ..... 9,970 0 0  
Hart ..... 9,950 0 0  
Merritt and Ashby ..... 9,860 0 0  
Smale ..... 9,834 0 0  
Hill, Higgs, and Hill ..... 9,798 0 0  
Bracher and Son ..... 9,798 0 0  
Browne and Robinson (accepted) ..... 9,650 0 0

**BRENTFORD.**—For the restoration of a 30 quarter maling for Mr. T. Lillier. A. Kinder, architect.  
Nye ..... £134 0 0  
Baines ..... 379 0 0  
Brimsden ..... 375 0 0  
Kirk (accepted) ..... 349 0 0

**DOVER.**—For bonded stores and warehouse for Messrs. Luley and Sons, exclusive of ironwork in floors, &c. Plans, specification, and quantities by Messrs. Whitley and Fry.  
Stiff ..... Estimate No. 1. £1,872 0 0 Estimate No. 2. £437 0 0 Total. £2,309 0 0  
Bourne ..... 1,710 0 0 480 0 0 2,190 0 0  
Wise ..... 1,692 0 0 480 0 0 2,172 0 0  
Matthews ..... 1,699 10 9 450 9 9 2,150 0 6  
Nightingale and }  
Bushell (too late) } 1,727 11 2 415 18 3 2,143 9 5  
Richardson (too late) } 1,676 14 10 314 3 0 1,990 17 11  
Brooks and Slade ..... 1,549 1 10 436 16 10 1,985 18 8  
Pain ..... 1,628 12 8 305 6 4 1,933 19 0  
Adcock (accepted) ..... 1,452 0 0 448 0 0 1,900 0 0  
Aiscomb ..... 1,330 0 0 418 0 0 1,748 0 0  
Architect's ..... 1,511 0 0 475 0 0 2,035 0 0

\* Accepted, but withdrawn.



ENFIELD.—For rebuilding the "Old Sergeant," Parsonage-lane, for Messrs. Gripper Bros., brewers. Mr. F. W. Searle, architect.

Bayes and Ramage	£870 0 0
Field and Son	770 0 0
Coots and Sayer	705 0 0
Palman	698 0 0
Fairhead	687 0 0

LEWISHAM.—For residence at Morley-road, for Mr. M. E. C. Phillips. Mr. Wm. C. Banks, architect.

Grubb	£1,675 0 0
Dunsmore	1,650 0 0
Staines and Son	1,484 0 0
White	1,430 0 0
French	1,320 0 0

LIMEHOUSE.—For works at No. 8, Grosvenor place, Commercial-road, for Messrs. Haddock and Selby. Mr. William Mundy, architect.

Ennor	£814 0 0
Marr	720 0 0
Hearle	685 0 0
Stamp and Rowle	679 0 0
Forrest	675 0 0
Blackmore and Morley (accepted)	648 0 0

MILLWALL.—For works required to be done in the adaptation of a warehouse at Orchard-house-place, Millwall, to the purposes of a school to accommodate 163 children, for the London School Board. Mr. E. H. Robson, architect.

Wood	£1,373 0 0
Kilby	1,282 0 0
Ennor	1,274 0 0
Sheffield	1,263 0 0
Atherton and Latta	1,250 0 0

\* Accepted, less £100 set apart for contingencies.  
Cost of building per head £6. 18s. 6d.

ST GILES.—For new premises, High-street, for Messrs. Nutter and Greenland, Mr. F. Beeton, architect. Quantities by Mr. W. S. Trehearne.

Patman and Fotheringham	£5,475 0 0
Macey	5,063 0 0
Simcox and Baker	5,032 0 0
Kinnimont	4,875 10 0
Newman and Mann	4,936 0 0
Bracher and Son	4,499 0 0
Coleman and Son	4,475 0 0
Smale	3,975 0 0
Martin	4,495 4 9

STREATHAM.—For new wing, Turkish and other baths, to hydropathic establishment, Serah House, for Mr. J. N. F. Hestermann, Mr. W. H. Tyndall, architect.

Gray	£1,985 0 0
Bassett	1,750 0 0
High	1,735 0 0

Architect's estimate £199. 9s. 9d.

TONBRIDGE.—For the erection of a brewery, for Mr. B. Baker. A. Kinder, architect and engineer.

Gallard and Sons	£1,753 0 0
Dove	1,750 0 0
Rudkin	1,710 0 0
Kirk	1,577 0 0
Punnett and Sons	1,496 0 0

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#### COMPETITIONS OPEN.

CARDIFF, Sept. 29.—For designs for the proposed Free Library, Museum, and Science and Art Schools. Mr. E. Payne, Hon. Sec., The Wharf, Cardiff.

COCKERMOUTH, Aug. 12.—For plans for a girls' school. Mr. J. Fearon, Cockermouth.

HASTINGS, Sept. 24.—For designs for a new Town Hall, with police offices, lock-ups, public offices, &c. Premiums of £100, £50, and £25 will be given for the three most approved designs. Mr. G. Meadows, Town Clerk, 8, Bank-buildings, Hastings.

MAIDENHEAD, Aug. 15.—For plans for a system of works for the supply of water to the town. A premium of £25 will be given for the best set of plans. Mr. E. Davey, Town Clerk.

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#### CONTRACTS OPEN FOR BUILDING ESTIMATES.

ACCRINGTON, Aug. 10.—For the erection of a mission and school at Woodcock. Mr. W. S. Varley, architect, Blackburn.

BATH, Aug. 18.—For constructing a stone and brick tank. G. Helps, Secretary, Bath Gaslight and Coke Co., Upper Bristol-road, Bath.

DEWSBURY, Aug. 12.—Contract No. 1. For excavating, concreting, and laying down foundations, and erecting stone pillars to receive a cast-iron gasholder tank. Contract No. 2. For constructing and fixing a cast-iron gasholder tank, with columns and girders. Contract No. 3. For the construction of a stone gasholder tank. Mr. C. A. Craven, Engineer, Gasworks, Bradford-road, Dewsbury.

DONCASTER CORPORATION WATERWORKS, Aug. 18.—For the construction of a storage reservoir in the Silverwood Valley. Mr. B. S. Brundel, C.E., 1, Princes-street, Doncaster.

ELY LOCAL BOARD OF HEALTH, Aug. 12.—For the supply and delivery of 1,650 yards of 1½ in cast-iron socket pipes. W. Marshall, Clerk to the Board, Ely.

FARSLEY LOCAL BOARD, Aug. 10.—For the supply of cast-iron street lamp-posts, with copper lamps complete. Mr. W. J. Watkins, Clerk to the Board, Farsley.

GUILDFORD, Aug. 21.—For repairs, &c., to the tower of St. Mary's Church. Mr. Withers, 122, High-street, Guildford.

HACKNEY.—For the erection of a hall in Havelock-road. Mr. G. Jackson, 3/5, East-India-road, Poplar, E.

HEADINGLEY, NEAR LEEDS, Aug. 13.—For the erection of a villa near Oil-mills-lane. Mr. C. Fowler, architect, Britannia-buildings, Leeds.

HOLBECK UNION, Aug. 10.—For painting and paper-hanging several rooms. Mr. C. Cluderay, Clerk to the Guardians, Holbeck.

HORBURY LOCAL BOARD, Aug. 15.—For making about 15,000 yards of cast-iron socket pipes. Mr. J. Lumley, C.E., 14, Kirkgate, Bradford.

ILKLEY, Aug. 10.—For the erection of 19 cottages. Messrs. Jackson and Longley, Architects, 2, Kirkgate, Bradford.

LANCASHIRE AND YORKSHIRE RAILWAY, Aug. 11.—For the construction of the Hoddesdon Branch Railway. Engineer's Office, Hunts Bank Manchester.

LEEDS, Aug. 13.—For the erection of an Independent Mission-room in Accommodation-road. Mr. C. Fowler, architect, Britannia-buildings, Leeds.

LEEDS, Aug. 14.—For alterations and additions to Wortley Grange. Mr. W. Watson, architect, Barstow-square, Wakefield.

MALVERN WATERWORKS EXTENSION, Aug. 10.—Contract No. 1. For the construction of a covered service reservoir. Contract No. 2.—For the construction of a storm water channel. Mr. J. E. Palmer, Surveyor, Malvern.

NEWCASTLE-ON-TYNE, Aug. 10.—For the erection of a Lutheran Church. Mr. F. R. N. Haswell, architect, North Shields.

NORTH EASTERN RAILWAY, Aug. 12.—For the erection of an engine stable at Paragon Hall Station, Hull. Mr. Burleigh, architect, York.

NORTH EASTERN RAILWAY, Aug. 12.—For the construction of the Castle, Elen, and Stockton Railway and branches. Mr. C. N. Wilkinson, Secretary, York.

OXFORD, Aug. 10.—For the erection of a new dining hall, with kitchens, offices, and other buildings, at Balliol College. A. Waterhouse, architect, 20, New Cavendish-street, W.

PECKHAM, Aug. 12.—For the erection of a Primitive Methodist Chapel in Summer-road. Mr. G. H. Fowler, 80, Mina-road, Old Kent-road.

SOVERBY BRIDGE LOCAL BOARD, Aug. 10.—For widening the county bridge over the river Calder. Mr. J. H. Smithurst, Surveyor, Town Hall, Sowerby-bridge.

ST. MARY ABBOTS, KENSINGTON, Aug. 19.—For the construction of 164 ft. of 3 ft. 9 in. by 2 ft. 6 in. sewers and other works in Thistle Grove, Brompton; and about 260 ft. of 3 ft. by 2 ft. brick sewer in Thurlow Mews. Mr. J. Broadbent, Surveyor, Vestry Hall, Kensington.

ST. GILES DISTRICT BOARD OF WORKS, Aug. 11.—For altering and repairing the offices, 119, High Holborn, W.C. J. H. Jones, Clerk to the Board, 199, High Holborn, W.C.

WAKEFIELD UNION, Aug. 11.—For the construction of about 520 yards of 16 in. by 12 in. earthenware pipe sewer, with manholes, &c. Mr. A. Lofthouse, Surveyor, 3, College Grove, Wakefield.

WAR DEPARTMENT CONTRACTS, Aug. 10.—For the erection of a riding school and infirmary stable at Brighton Cavalry Barracks. Major R. W. Duff, Royal Engineer Office, Brighton.

WORTLEY, Aug. 11.—For alterations and additions to offices at Wortley. Mr. C. Fowler, architect, Britannia-buildings, Leeds.

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## THE BUILDING NEWS.

LONDON, FRIDAY, AUGUST 14, 1874.

## COLOUR.—III.

## APPLICATION OF PRINCIPLES.

**P**ROCEEDING to apply the principles of simultaneous contrast of colours, let us say a word as to the use of this law to the artist. However gifted as a colourist he may be, he may yet find it of infinite advantage to be able to perceive what modifications of tint or tone are necessary to produce the effects of light, or to harmonise the colours of a composition to the best advantage. Without such knowledge his genius is more or less mis-directed, or his facility as a colourist becomes the result of empiricism. If he wants to blend or contrast two or more colours, he tries again and again, till his tints please his eye, much in the same way as a quack would give tonics or alteratives, or prescribe changes of diet till the health improved, or the required result was obtained. This sort of empirical art knowledge, however, is always unsatisfactory, as it necessitates the experiment of costly egregious blunders in some of our noblest edifices before the fault is perceived.

The conclusions arrived at from the law of contrast were: first, that when two coloured bodies are viewed at the same time, neither appears of the colour peculiar to it, but of a tint resulting from its admixture or blending with the complementary of the other body.

Again, if the colours be of two different tones, the lightest will be lowered and the darkest heightened. Here we would refer to other kinds of contrast than *simultaneous*, which is the phenomena of modification when colours are seen together. Now there is also a successive or *mixed contrast* which the colourist has to regard. The phenomenon is this: the retina having impressed upon it a colour which has been seen for some time has an aptitude to be impressed with the complementary of that colour, and when another colour is presented to the eye at that moment, the sensation is the result of this new colour and the complementary combined.

It may be easily observed. Close one eye, and look steadily with the other at a colour A; when the sensation is dulled, and another colour, B, being immediately seen, the eye perceives a mixture of the colour B with the complementary (C) of A. Chevreul gives examples of mixed contrast. The left eye having looked at red has an aptitude to see afterwards green, its complementary. If yellow is thereupon seen, the impression is a mixture of green and yellow. The left eye being now closed, and the right opened, it sees yellow, and this may appear more orange. Now this effect of "mixed contrast," as it has been called by Chevreul, explains certain facts which are of great value to colourists. Painters anxious to imitate the exact colours of their models often look at them so long as to become perfectly blind to their tones and characters. This sort of colour-blindness also affects anyone who sees for any continued time a bright colour or a picture in which a particular colour predominates. Who has not, in gazing at a brilliant red sunset, or bright yellow picture, become ocularly enfeebled at seeing another brilliant colour? To obviate and correct these fatigued and false impressions of the retina, the dealer in coloured fabrics should show, after the eye has been satiated with red materials, green ones. So again, if the eye has been fatigued by yellow, the proper corrective, violet, should be administered, or the latter will tinge and completely destroy the evidence of any other colour after yellow.

Thus this tendency of the eye to see the

complementary of the colour which predominates, or which has been looked at for some time, should be carefully considered in all compositions of colour, so that they should possess the complementaries, or such a balance of colour as shall correct a false impression. Now, the painter knowing this modification of contrast, has simply to mentally estimate or allow the influence of a complementary upon an adjacent colour or colours, and so regulate them in intensity and tone. It is the complex effect he has to regard, the reciprocal influence or contrast of bright colours and different tones. Taking red and blue as an example, the artist who desires these two colours to contrast most harmoniously must neutralise or destroy the effect they have when contiguous, or of the red becoming orange as it approaches the blue, and of the latter becoming green as it approaches the red; he must, in fact, emphasise the opposites of these impressions, or separate them by white or reduce them by shade. Thus we find the ancients, who used bright colours, used them in strict obedience to this law; the colours were distributed in the most intelligent manner, and were separated by white, or the more retiring colours.

Again as to tone, the artist must not lose sight of the modification produced by different contiguous tones of the same colour. For example, several borders or bands of flat tints of the same scale appear channelled, as we have seen. Now the correction of this impression is to reduce the darker tone and strengthen the lighter at the line of contact, gradually softening off as they recede. Thus also as *chiaroscuro* is produced at the line of juxtaposition, it teaches the artist that two very delicate shades of tone may produce a greater joint effect than he might suppose; and the same gradation of tone of flat tints holds good in all juxtapositions of colour distinctly separated.

The law of contrast, then, may in various ways impart value to colours, and the artist can choose what course is best in each case. The contrast of opposite colours is sufficiently agreeable when they are of the same tone. To avoid crudity, the light tones of their respective scales, or to avoid monotony, pure colours mixed with grey, may be adopted.

We have been speaking hitherto of the value of the law of contrast in the use of pure opposite colours, and of those broken by grey, or broken by a tone complementary to the pure colour. There is another harmony of colour before adverted to in which instead of variety of colour, *harmony of scale* is considered. Contrasted assortments of colour are useful in those minor details and portions of buildings and decorations which require greater expression than the architectural lines or the simple *chiaroscuro* can give. In features and patterns and wall surfaces near the eye, such contrasted colouring may become a valuable accessory to the work. Yet there is a boundary or limit to such colouring. It may, on the other hand, be more distracting to the eyes of the spectator, as, for example, when we see colours of purity and contrast upon an extended wall surface which the eye must take in at a glance, or upon a vaulted ceiling as that of St. Paul's Cathedral. In these positions, such diversities of colour and tone are entirely misemployed, and we should have recourse to less violent and less contrasted combinations. Chevreul justly observes, in speaking of painting, that the nobler the expression of the artist's model, or the grander the physiognomy of the figures, the more sombre should be the colour employed, and instances Vandyke, who used the simplest means of producing effect.

It has also been remarked that when one colour predominates, or when an edifice is illuminated by a coloured light, the modifications resulting from a mixture of colours comprising the recombination of white light by a proper proportion of the elementary rays or colours, must be taken into account; for it

is evident that when coloured rays fall upon various colours, it may strengthen some and neutralise others. Consequently, in employing a predominant colour, as that created by rays passing through coloured glass, we must renounce the combination of others. This is a principle that has been violated by nearly all our polychromists, who employ wall colouring and pictures at the same time as they use bright painted glass windows, forgetful that the latter entirely destroy some colours and neutralise others. But till our next we will reserve the subject of the harmony and distribution of colour in buildings.

## HOSPITAL CONSTRUCTION.—II.

## GENERAL ARRANGEMENT.

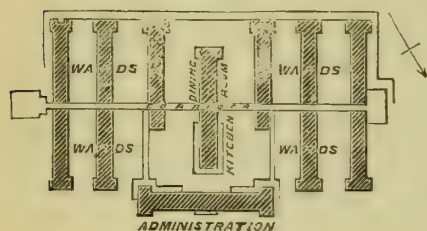
**I**N our last article the arrangement and grouping of the wards, as far as site is concerned, was discussed. Supposing the best means of distribution to be arrived at, the next question the architect is called on to decide is the general connection which should be observed between the hospital proper and the administrative offices of the establishment, having always due regard to the free circulation of the outer air round the pavilions or blocks. Now the hospital proper consists of the wards, having at one end the nurses' rooms and sculleries, and at the other end the baths, water-closets, &c. One great principle must be always kept in view—namely, the thorough isolation of the pavilions. By placing intervening buildings the advantages of the pavilion plan are more or less neutralised. The only necessary erection is a sheltered corridor. This may be low, and form either an arcade of open arches or a piazza, with columns on each side, as at St. Thomas's Hospital. A compromise may, we think, be usefully employed, as in the Herbert Hospital at Woolwich, where the corridor is arched and the openings filled with glass windows, which can be opened at pleasure. Such a protected corridor can be utilised as a kind of exercise-ground or walk for convalescents. These communications should be kept low, especially between double pavilions. The roofs of these corridors may also be usefully made flat, so that patients in the upper wards may be wheeled out in their beds to be treated in the open air if thought desirable. This use was contemplated, we hear, in the Herbert Hospital, so that war-wounded patients could be so treated. A clear headway of 8ft. 6in. is considered ample. Another point is the location of the administrative departments. In old hospitals the separation and complete isolation of the blocks was not thought of, and, consequently, we see the architect, for the sake of architectural compactness and solidity of effect, or to produce imposing mass, brought all the subsidiary offices into close connection with the sick-wards—a fatal error, which our improved ideas of hygienic construction have exploded. It is true this plan was most economical, as it was capable of affording accommodation under one roof for several hundreds of patients; but as there was a community of atmosphere throughout the building, such an arrangement is self-condemnatory. One of the best illustrations of the evil results of this system is instanced in the old Hôtel Dieu at Paris, which was built on both sides of the River Seine, and ultimately was enlarged by additions at the ends across the river, the large cubical air space thus enclosed, and which contained no fewer than 2,500 cases in the year 1792, created a mortality as high as twenty-five per cent. Other equally objectionable instances are recorded, and point to a more open and sub-divided arrangement of buildings as the only correct one. The modern principle proceeds upon a totally different principle, that of the sub-division of the sick, and the complete separation of the wards and their appurtenances from the administrative department. This latter is common to the whole hospital;



and it is an important point to consider where it can best be placed, and how its efficiency can be best attained.

The vital point of keeping the sick-wards perfectly intact, and surrounded by air, can only be effectually secured by separating those parts of the offices from which effluvia is likely to rise and intermingle with the pure air. With all the care with which modern hospitals have been planned, the evil of contamination from these sources is not always guarded against, and a community of atmosphere often exists from these causes. We are told St. Thomas's Hospital, though planned upon the new system, is faulty in this respect. It must not be deemed superfluous to press this point, as the effluvia arising from imperfect kitchens, latrines, &c., often increases the death rate; so that we see with all the care in the subdivision of sick-wards under separate roofs, yet imperfect planning of the subsidiary functions of a hospital may completely neutralise and frustrate all the advantages gained.

Therefore real isolation must be aimed at. The only course recommended is, therefore, to entirely separate the sick wards or pavilions from the administrative part of building, also from out-patients' departments, kitchen, stores, boiler and engine rooms, &c.; in fact, to make the hospital proper a distinct building or group of blocks from the other parts; the wards having nothing attached to them beyond their adjuncts in the shape of ward offices, as nurses' rooms, latrines, &c. Such a dual division being arrived at, the administrative block or blocks may be so designed as to include the out-patient and dispensary departments; though medical men prefer an entire separation of the former from the hospital administration. Easy communication



between these departments should be planned regarding the free circulation of air round the wards block. Of course, in cottage or small country hospitals the isolation of the wards, administration, and out-patients' buildings can be more completely attained than in large town hospitals which we are chiefly considering here. Hospitals for small towns may consist of a ward block of two large and two small wards, nurses' rooms, bath, water closets, &c., being on the upper floor. The ground-floor could be utilised for the surgery, living rooms, dispensary, stores, &c. Out-patients' departments might be placed on the ground-floor, with separate entrances. The kitchen offices may form a detached block, connected with the hall by an open verandah. But in large town hospitals the combination of air-isolation and facilities of communication is a more difficult problem. There are, however, several ways of disposing the blocks. We will mention two or three. 1. When the site is long and narrow, the administrative department may form the central group of buildings, and be either quite detached from ends of wards, or joined to the hall and staircases, the kitchen being placed in the rear, isolated, and approached by an open corridor. 2. When the site admits of a quadrangular arrangement of wards, these departments may form a separate side or block. In the Herbert Hospital, a sketch outline of which we give, the difficulty is effectually met. The details of this and other arrangements we will describe in our next.

## HISTORIC ART STUDIES.

### ITALIAN SCULPTURE OF THE SIXTEENTH CENTURY.

(See Double-page Illustration, BUILDING NEWS, 7th August, 1874.)

NOT less than seven Lombardi distinguished themselves in architecture, sculpture, and painting during this period of art. We can hardly be certain whether we have to deal with members of one family, or whether the name merely refers to their birthplace, but the similarity in their compositions in the three branches of art permits us to classify them with Alessandro Leopardi, as one powerfully ruling dynasty in the realms of Art. Throughout the whole of the fifteenth, and far into the sixteenth century, the Lombardi: as Antonio, Girolamo, Pietro, Tullio, Giacomo, Giulio, or Paolo, worked in Upper Italy in the revived style of the Antique, inspired by Christian thought and sentiments. Churches, tombs, and scenes from the Old and New Testament were their principal subjects. One of the most exquisite works is the tomb of the Doge Andrea Vendramin, in the choir of the Church of SS. Giovanni e Paolo, at Venice, planned by Alessandro Leopardi, and executed in part at least by Tullio Lombardo (see Fig. 13.) The white marble has been well used to glorify the deeds of one of the mighty rulers of the Adriatic. On the richly ornamented socle two angels hold the tablet with the inscription, and fantastic sea monsters on side panels refer allegorically to the maritime power of the Doge. The tomb has three divisions. The middle piece contains the sarcophagus, supported by eagles, and watched over by wingless angels, holding torches in their hands; the "lunette" shows us Vendramin worshipping Christ, who stands on the knees of the Holy Virgin; the entasis of the huge side-pillars is unusually strong; the two side divisions contain in niches the nude figures of Adam and Eve, or rather of Mars and Venus; Eve especially is, in her position, an imitation of the Venus of Medici. The whole is crowned by a medallion, held by charming winged sirens, on which is represented the infant Christ. The projecting socle is ornamented on both sides with armed male figures. The technical execution is in all its details highly finished. The arabesques and other ornamentations, as shields, framework, pilasters, and cornices, bear the marks of a deep study of the Antique, and exhibit great taste in the arrangement of the whole. The bronze bas-reliefs from the tomb of Torriani, from the Church of S. Fermo at Verona, taken by the French in 1796, and now adorning the door of the "Salle des Caryatides" in the Louvre at Paris, are by Antonio Riccio, in the realistic style of Donatello. They represent man in the different phases of disease and death. The treatment of the details and the whole disposition of the groups remind us forcibly of the old Roman sarcophagi, but the tenderness of feeling, and the passionate expression of love and care for the sick, are thoroughly Christian. The nude body of a dying man forms the centre figure (see Fig. 14, one of the panels); and is surrounded by earnest-looking physicians, and carefully attending women. The three "Parcæ," pointed out by a youth with a lyre in his arms, allegorically refer to the approaching end of the principal figure. A masterly disposition in the grouping and great naturalness are the distinguishing characteristics of Riccio. The legend of Phrixus, the son of Athamas and Nephele, and the brother of Helle, inspired Jacopo Sansovino to produce one of the most charming reliefs (see Fig. 15.) He chose the moment when Helle falls into the sea between Sigeum and the Chersonesus (whence the name "Hellespont" is derived), whilst Phrixus safely continues his journey to Kolchis on the ram with the golden fleece. The simplicity in the composition, and the refined execution, make the group one of the masterpieces of the Renaissance period. The relief adorns the Loggia of the Campanile of S. Marco at Venice. Entirely different is the

subject executed in terra-cotta by Alfonso Lombardi, "The Death of the Virgin Mary" (see Fig. 16), in the Oratory of S. Maria della Vita at Bologna. The Virgin lies on a couch surrounded by Christ and the apostles; the consternation at her death is general; deep mourning clouds the faces of all the bystanders, whilst despair is plainly expressed in the nude figure in the foreground. Realism is softened by a poetical idealism; the group is symmetrically arranged, and the composition is well balanced. Fig. 17 gives us some sculptures from the Certosa at Pavia. Though the decoration of the Church dates from the fifteenth century, some figures on the left corner pillar of the façade must, according to the style, undoubtedly be products of the sixteenth century. They stand in niches on richly ornamented consoles. S. Veronica, holding a veil impressed with the countenance of the Redeemer, is to the right; S. Bartholomew tied to the trunk of a tree occupies the outer corner, and either Faith or S. Blandina leaning on a pillar is represented to the left. The arabesques of the centre-panel are far too crowded, the law of repose is sinned against, and the foliage is overdone; simplicity and good taste are sacrificed to over-decoration. Benvenuto Cellini (1500-1572) has left us many unsurpassed works. Amongst these we have a bronze statue of Perseus holding the head of Medusa (see Fig. 18), now in the Loggia de' Lanzi at Florence; the wax model of it is in the "Uffizi," and we possess a masterly cast in the South Kensington Museum. Perseus with the winged sandals, the helmet of Hades, and the magic wallet, stands on the body of Medusa, and holds her newly severed head aloft, from which and from the trunk blood is streaming. The head of Medusa is rather small, the position affected, and the legs unintelligibly entangled. The execution is perfect. The subject shows the influence of that sensational tendency which was an outgrowth of the genial master-works of Michael Angelo. Some small figures adorning the pedestal of the statue of Perseus are charming; among them are Danaë, with her child; Perseus (see Fig. 19) placed in a niche—a composition worked in a pure Classical style. Less excellent is the nymph of Fontainebleau, a bronze relief over the entrance gate of the castle (see Fig. 20), a cast of which may be seen in the South Kensington Museum. The form of the nymph is in the highest degree voluptuous, and at the same time too theatrical; the arrangement of the animals, in spite of their number, is good. The legs of the nymph are too elongated, and the drapery is stiff and conventional. Benvenuto Cellini excelled chiefly in his smaller gold and silver works; as a specimen we give one of his genuine masterpieces, a salt-cellar from the Ambrasian collection (near Salzburg), now in the Belvedere at Vienna (see Fig. 21). Poseidon and Kybele sit opposite each other, he on a monster, and she on the head of an elephant; the one representing the salt ocean, the other the earth with its spices. On one side is a barge for the reception of salt, whilst on the other is a vessel in the form of a triumphal arch for the pepper. The stand is of ebony, richly ornamented with golden reliefs, which resemble some of Michael Angelo's compositions in the Chapel of Medici. Francis I., for whom the salt-cellar was made, was delighted with it, but Cellini took it home to consecrate it himself by using it at a supper given to some of his wild companions. We cannot help admiring the fantasy, taste, and rich composition of Cellini, and yet we see in him the transition-link from revived Classicism into the bizarre style of the later or degenerated Renaissance in decoration and sculpture. Michael Angelo's genius and its wonderful effects had an intoxicating influence on his successors. Arbitrary, wild, and forced forms superseded Classic simplicity and tasteful elegance. Realistic vulgarism pervaded the weak and sensual forms. The men had sharp, projecting muscles, they belonged to



the class of heroes created by the lively imagination of a "Ouida," and the women were turned into phantoms of the poetry of Swinburne. The dresses are not to cover and to reveal with decency the beautiful forms of the female body, but to heighten their curved lines and to excite the lowest passions. Little angels begin to balance themselves like acrobats on marble clouds; allegories abound, intermingling the myths of the ancient world with the legends of saints and martyrs who take a sensual delight in the torments which they have to undergo. The line between beauty and moderation is once more lost, to be regained only through a renewed study of the Antique.

We base these art-studies on the stern rules of æsthetics, and cannot notice opinions or protests coming from those who look one-sidedly upon art. Such men as select one special art form, according to their individual taste, and see neither the spiritual germs, nor the social and religious conditions, which brought forth certain forms at certain periods; who devote themselves to a mere soulless copying of the past, deserve no attention. Mr. A. Thompson, who, we must remember, is a practical architect, is perfectly right in saying: "For the last fifty years we have been rattling and fumbling amongst the fossil remains of the great Gothic mammoth, but as yet there is no sign of returning life." These are words full of truth—the antediluvian Gothic mammoth was conceived at a period when art was in an undeveloped state, and we may still stand astonished before its mighty dimensions. When man was once created, the divine artist encased the unwieldy antediluvian forms in stone, and they are now only exhibited in our museums in a petrified state. It is the same with peculiar shapes in art; in the course of time they die out, and make room for others. Whatever has been conceived in form, deserves study but not reproduction, for art is a progressive development of combination of forms, according to certain general rules; and not a self-satisfied mummy admiring its own beauty, because it is old and shrivelled, or huge and monstrous. It is a sign of progress in our times that we are able to treat art from a scientific point of view. We are convinced that the different forms of architecture, sculpture, painting, and even of ornamentation are not the intentional works of single individuals, but the products of the general consciousness of a nation with regard to taste and religious and intellectual culture. The single artist creates under the influence of these impressions, and is the more successful the more he reflects the general feelings of his time. To transpose art forms, to work in a prehistoric style, or imitate the zig-zag scrawls of savages, is to commit an unpardonable anachronism. In thus transferring forms of the past to our own times, we either acknowledge our incapacity to be original, or we falsify our sentiments in giving them incongruous expression. Who would go, in our age, to war with matchlocks, and despise the Snider rifle? A developed art has the same right to reject the past, except when artistic products have once reached perfection in the representation of the human form, or in a correct application of the laws of taste and beauty. The Greek and Renaissance artists ought not to be imitated, but studied. We must try to become conscious of their excellence, and apply it to our original combinations. If we object to a revival of peculiar architectural or ornamental forms, it is not from a narrow-minded antipathy to them, but on a strictly historical ground. We insist as little on the reproduction of the Parthenon as on seeing all our friezes ornamented with Panathenaic processions; what we must demand is a correct appreciation of the artistic principles which made the Parthenon an artistic architectural production, and the sculptures of Phidias the most perfect creations of statuary.

#### GERMAN, SPANISH, AND FRENCH SCULPTURES OF THE FIFTEENTH AND SIXTEENTH CENTURIES.

(With Double-page Illustrations.)

Florence was already the Athens of Italy, whilst Nuremberg and Augsburg were the gloomy schoolrooms of theological abstractions which inspired the products of the Renaissance sculptors and painters during the times of the Reformation. Whilst Niobe was transformed into the "Mater Dolorosa" by the Italians, and Ino Leukothea served as the "Virgin Mary with the Child," Veit Stoss (1447-1542) worked at Nuremberg his Virgin Maria in wood (see Figs. 1 and 2), and took his models from the respectable middle-classes of the German towns. The long waving hair, the tight-fitting dress, the scanty drapery, the eminently Teuton faces, the long arms, all point to originals that were neither Oriental in conception nor idealised through the study of the Antique; but had one advantage, as they freed the figures of the Old and New Testament from conventionalism, humanised them, and thus brought them so much nearer to man. An unknown master of Nuremberg has given us a Mary with the Dead Body of Christ (see Fig. 3). Our readers will do well to compare this composition with that of Michael Angelo, which we gave in our last illustration. As marble stands to wood, idealism to realism, so stand the two compositions to one another. Amongst the stonecutters of this period, Adam Krafft, (d. 1507) was one of the best. His most exquisite work is the Tabernacle (Sakramentshäuschen) in the Church of St. Lorenzo at Nuremberg. With the technical skill and patience of a Chinese ivory-carver, Krafft treated the stone, and succeeded so well that it was asserted that his work was done in some pliable material, and afterwards hardened into stone. This was, however, not the case. The tracings, foliage, mouldings, shields, finials, niches, turrets, statuary, are masterpieces of realistic treatment in the conventional Gothic style. Figs. 4, and 4a, show us portraits of the master himself, and of a kneeling workman, who are the supporters of the whole construction. In the same style is the Crucifixion (see Fig. 5), in which we have compressed figures, large heads, and heavy drapery; but at the same time a tendency to relinquish the accepted types and to substitute figures and forms from actual life. The Virgin Mary with the Child (see Fig. 6) is by the same master. The drapery is lighter, and the child a most charming form; the mother is less poetical in her features, the South Teuton type being too marked. She is surrounded by angels, supporting her cloak, and holding a crown over her head. The relief was ordered by the members of the family of Peggendorf, and is in the "Frauen"-Church at Nuremberg. Life-like portraits of the founders kneel before the Virgin. What Veit Stoss and Adam Krafft were in wood carving and sculpture, Peter Vischer (d. 1529) was in bronzework. The tomb of St. Sebaldus (an excellent cast of which is in the South Kensington Museum) in the church of the same name, is by him. The coffin is of silver, and the Baldachin, in the Gothic styles of bronze (see Figs. 7, 8, 9, and 10). It is 15ft. high, 8ft. 7in. long, and 4ft. 8in. broad. The delicate tracery, worked in metal, is admirable. The variety of groups, turrets, pillars, and arches, is astonishing; the decorative foliage is intermixed with statues of saints, 1ft. 11 in. in height. On the pillars, St. Sebaldus, St. Paul (see Fig. 8), and the other apostles are represented; on the base is a portrait of Peter Vischer himself (see Fig. 9). In addition, there are a number of mythological figures, Strength, Wisdom, Justice, Moderation, &c., and the miracles of St. Sebaldus (see Fig. 10), whilst tritons, sirens, satyrs, fawns, angels, dolphins, and harpies abound in this fantastic composition, uniting the recklessness of a Southern imagination with the technical realistic naturalness of the North. Vischer was the Ghiberti of

Germany. The latter was thoroughly Classical in the treatment of his groups; the former powerfully realistic, and though softened by an understanding of the spirit of his times, too strongly fettered by the geometrically stiff treatment of Gothic forms. "Christ with the Sisters of Lazarus" (see Fig. 11) was finished in 1521, by the same master, for the chapel of the old parish-church of St. Ulric, at Ratisbon; it is now in the Cathedral of the same town. The composition is simple; the treatment of the drapery masterly, the outlines are correct, whilst the dignity of expression on the countenances of Christ and the female figures renders the work worthy to rival those of the great Italian masters of this period. Had the Germans possessed the same facilities for making themselves acquainted with the Antique as the Italians, A. Dürer, Peter Vischer, and Holbein would rank far higher in art-history. The meaning of this will be understood by those who are acquainted with the difficulties which beset Art in Germany. There was no Julius II., or Leo X.; there were no wealthy republics to encourage struggling genius. All had to grow out of the people, who were oppressed by feudal institutions, suffering from political dissension, disturbed by dogmatic controversies and religious quarrels. There was no head to the State, no unity in the nation. The aristocracy was impoverished, or without taste; and Art was relegated to the huts of the peasants, or the dwellings of hard-working artisans and tradesmen. The cobblers, tinkers, shoemakers, tailors, carpenters, and hosiers of Germany were all deeply engaged in discussing, expounding, teaching, and preaching the gospel: they delighted in small woodcuts and engravings, in anything small enough to be put on a shelf or to be kept in a cupboard. They were afraid to lay out large sums on public monuments, for they did not know which party would prove victorious, the iconoclastic Reformers or the image-worshipping Catholics. The high roads were unsafe, commerce languishing, the trumpets calling to battle were far louder than the sound of the curfew marking the time for peace and rest. Nuremberg, according to Luther, was at this moment the eye and ear of Germany, but it was a very dim eye, and as an ear it was only sensitive to litanies and psalmodies. In spite of this distressing social, political, and religious state, the Teuton spirit showed itself active enough to rival the great artistic revivalists of Italy and France. As a specimen of this activity in a new direction, though not altogether a fortunate one, we may mention the polychrome wood-carvings of George Syrlin, jun., of Ulm, who executed a large altar-piece in the church of Blaubeuren. The whole is in the form of a triptych, of which we give one wing, the "Adoration of Christ by the Magi." The outlines are charming, but, archæologically, the work is childish. One of the Magi, Balthasar, the Negro, is represented with high boots and spurs, and a sword with a cross handle, and on his trousers are the arms of the Guild of Weavers. The house before which the Virgin Mary sits is a Western wood construction, unlike anything ever built in the East. One of the grandest and most characteristic monuments of this period is that of the Emperor Maximilian I., at Inspruck, by Stephen and Melchior Godt. We give two of the side statues—that of Theodoric, King of the Goths (see Fig. 13) and that of Margaret, daughter of the Emperor Maximilian I. (see Fig. 15). As a study of the costumes of the sixteenth century they are both most valuable, as also for their simple truthfulness. As a proof of the powerful influence exercised on English art by that of the Netherlands during the fifteenth and sixteenth centuries we produce a painted glass window (see Fig. 15) now at Islington, representing a youth sitting at a table, writing. The details of the furniture are minute, and in the style of a Dutch "still life." A bas-



relief from the tomb of Henry VII., of England, representing John the Baptist and John the Evangelist (see Fig. 16.), is characteristic for its rough, matter-of-fact style. The drapery is coarse, the position of the two figures forced and heavy, but we can trace some Italian influence in the treatment of the features of the figures. A bishop carved in oak, about 4ft. high, from the church at Barneak, near Burleigh House, is more in the Belgian than the Italian style. The drapery is rich, excellent in technical execution, and the accessories are treated with great delicacy (see Fig. 17).

Spain at this period was like England, more or less under the influence of the Netherlanders, though we can trace here and there German and Italian characteristics in the compositions of Spanish sculptors. The tomb of the Infant Don Alonso, by Gil Siloë, erected in the Carthusian church at Miraflores, built by John of Cologne, consists of a richly decorated niche in which the statue of the Infant is seen kneeling (see Fig. 18). The drapery is rich and in a good style, the ornamented robes of the figure, the tassels on the cushion, the embroidery of the cover, and the cushion on which the prince kneels, are worked with great technical skill. Clumsy in composition, reminding us of the realistic Donatello style, are the two reliefs (see Figs. 19 and 20) by Alonso Berruguete, from the tomb of the Cardinal and Grand Inquisitor D. Juan Tavera, in the church of St. Giovanni the Baptist, at Toledo. The Cardinal, who was one of the confidential advisers of Charles V., is represented lying on an antique sarcophagus adorned with reliefs, from which we give the "Baptism of Christ" (see Fig. 19), and the "Execution of John the Baptist" (see Fig. 20). The monotonous composition, and the compressed figures in both reliefs, are striking. The redeeming points in both are the refined treatment of the features of the angel in one, and the woman holding the dish in the other. We scarcely need draw attention to the ridiculous position of the soldier with the sword ready to sever John's head, for the artist has not shown how this feat could be accomplished, unless by the assistance of some supernatural power. The tomb of Cardinal Cisneros, the founder of the University at Alcalá, in the church of St. Ildefonso, at Alcalá de Henares, by the Italian artist Domenico Florentino (see Fig. 21), is in the Renaissance style. Shields and statuettes are executed with neatness. The eagles are sharp and powerful, and remind us of the curule chairs of the Romans; the guilloche and leaf ornaments are Greek; the whole, however, is over-decorated, and the statue of the Cardinal is very stiff, and the drapery clumsy.

Entirely different from either German, English, or Spanish sculpture was that of France. It cannot be denied that the French worked in the Italian style, that they were the pupils of the Florentine, Venetian, and Roman artists, but the sensational life of the French, especially under Henry II., was strongly reflected in their works of art. Jean Goujon (d. 1572), though educated in Italy, improved in many respects upon the reliefs which had too strong a pictorial tendency. The marble relief from the Louvre (see Fig. 22) representing a Bacchant reposing after the enjoyments of a wild and riotous festivity, surrounded by satyrs, nymphs, and geni, is graceful in composition, but shows a tendency to forced theatrical grouping. The limbs of the Bacchant are too elongated; but the faces of the geni are full of delicate charm. In a similar style is Diana of "Poitiers" as Ariadne (see Fig. 23), probably the work of some sculptor of the then distinguished school of Tours. King Henry II. was a great protector of fine arts, but as changeable in his tastes as in his love. The statue represents the French Diana when forsaken by her French Theseus. The marble is used to produce an objectionable sensual effect; the forms are not softened by ideal refinement; on

the contrary, the waving lines are sharply marked, so as to give the whole a voluptuous Indian shape. The draped Caryatid from the Louvre (see Fig. 24) and another representation of Diana of "Poitiers" (see Fig. 25), both by Jean Goujon, are in a better style; though all his faults are to be traced in both productions. The drapery on the Caryatid, in spite of its excellence, is too affected, whilst the limbs of the Diana are too elongated, reminding us forcibly of Benvenuto Cellini's Nymph at Fontainebleau. The position of the greyhound and of the stag betray the artist's love of "attitudinising." Still we may always learn from the French a certain grace in which we are often sadly wanting.

ERRATUM. In the last Historic Art Study read for "Muhomed"—Muhammed.

G. G. ZERFFL.

### THE CANON OF BEAUTY IN GREEK ART.\*

VARIOUS attempts have been made at different times by the ingenious artist to detect and define the normal type of symmetry of the human form, to investigate the geometry of that form as conceived by Phidias, and exhibited in those masterpieces of Greek Art which still transcend all modern imitations. Careful measurements of the masterpieces of the sculptors of the Attic School have clearly shown a close adherence to definite and subtle laws or rules of proportion which they observed. We know, too, that the figures of the frieze of the Parthenon, when tested by rule and callipers, show not only the observance of such definite proportions, but also certain optical corrections in the proportions of the head and other parts, which were made with a reference to the particular point of view from which the figures were to be seen. These corrections or allowances for the foreshortened effects figures at such a height above the eye have been found to agree with experimental calculations.

The investigations which have been made into the Greek Canon of Symmetry plainly show certain rules which all writers have admitted, though the actual basis of that canon has been a matter of doubt. An article in the *Edinburgh Review* deals with this subject in an exhaustive manner, and lays before us some very interesting facts in relation thereto. Let us briefly refer to them, at the same time premising that, although such investigations may be thought more curious and speculative than useful, they show, at least, an attention to the laws of proportion among ancient artists that may put to shame many of the modern schools of both sculptors and architects. When we find that the subject of human proportions engaged the attention of the Egyptian artist more than 5,000 years ago, and that different canons of proportion were in force for a period of over 3,000 years, we are led to regard these rules with some degree of interest beyond the mere archaeological fact.

Albrecht Dürer devoted minute and painstaking labour to the subject of symmetry of the human figure. The work which contained these investigations was published at Nuremberg in 1528; several Latin editions followed in successive years, the last at Paris in 1535. His book, however, appears to have been fruitless of any system or canon that could furnish any rule to the artist. His principles seemed to have been based upon the volume and weight of the several limbs, and he has studied symmetry as identical with the balance of form. The book is crowded with detailed measurements of the stereometry of the form to that end, and evinces immense labour. It has been observed, however, that such measurements, founded as they are on the German type of men and women, are quite at variance with those proportions upon which Antique Greek symmetry is based. Of Michel Angelo we are

told that he was "far from being either an undeniable or safe" authority on the subject of symmetry. His genius, however, was powerful. "He attacked marble under a sort of divine fury, hewing out his ideas at once from the solid block, without waiting for the slower and surer guidance of the modelling in clay; the chips flew from beneath his chisel like a storm of Arctic hail." His work was more pictorial than sculptural, however, and unlike Antique art in the exaggerated development of muscle.

Leonardo da Vinci in the "Trattato della Pittura," has shown a thorough appreciation of symmetrical laws, but the work is too fragmentary to possess any value. Da Vinci, like Dürer, has made proportion to depend more on dynamical laws than that of abstract geometry. Yet Da Vinci's treatise, from which our modern rules are taken, give valuable ideas of anatomy, proportion, motion, and equipose of figures, light and shadow, colour, &c. As to the rules of symmetry, they are wanting in a definite modulus or unit of measurement—the head and face all variously taken. His figure of Leda shows, however, the exact proportions as used by the Greek sculptors in the purest era.

Coming to our own time, German ingenuity has not been fruitless. Johann Gottfried Schadow has written on symmetry and proportion, and his book is profuse in detail and learning on the subject. Dr. F. P. Lihartzik, in a work on the "Law of Increase and the Structure of Man" (Vienna, 1862), has collected and tabulated a series of measurements of the head, the trunk, and limbs at various periods, from that of birth to the age of 24, when growth he considers normally ceases. The book contains much of direct value on the enquiry. The diagrams show a "fair approximation" to what is considered as the recovered Greek canon. The equal division of the total height of figure at the end of the trunk accords exactly with it, though the German head averages, by the experiments, a greater size, and the neck is longer than that of the Greek Canon. Dr. Lihartzik's model man also has a slighter thorax than that of the Venus de' Medici, and considerably less developed than in the stronger, manly types of the Greek art. The greater size of the German head is, however, not that of the brain, but of the face; so any assumption of the superior intellectual development of the German model is at once set aside.

It may be observed here, that the line for referring the height of the living figure, is that of horizontal vision, or that which lies in the plane that passes through the eyeballs when directed towards the horizon. This line, in the Antique, is exactly midway between the crown of the head and under-side of chin. In Dr. Lihartzik's normal type the head is 5-960ths smaller, and the face 16-960ths longer than in the Classic type; therefore the ideal Greek head shows a superiority of intellectual over the animal expression. As the writer observes, the ethnological elements must be taken into account in the development of proportion. National types are distinguishable in all sculptures; the artist reproduces the likeness of his models, however idealised he may make them. Thus, we have the full and massive Flemish women of Rubens. Again, Italian models vary. The women of Rome have distinct types, as the fully-developed, majestic figure, and the "delicate and refined beauty of the *signorine* of some of the noble houses."

Dr. Lihartzik observes also, that the human body grows in height as well as in girth during the twenty-four years. This period is divided into 360 epochs, the length of each successively increasing; thus the first is a month long, the second at end of three months, the third at the end of six months, and so on. These again are divided into three groups, and during each of these grouped epochs the growth of the body is stated to be equal, the increments lessening to 2 centimetres in each of the last. This gradual diminution is not always observed, however, at every stage.

\* See article in *Edinburgh Review* for July, p. 168.



Mr. Hay again, in his work "Nature's Principles of Beauty as Developed in the Human Figure" (1852), is one of those transcendentalists who are not content to take geometrical means, but must find the laws of Symmetry in the musical chord, or that the main vertical divisions of the figure are identical with those of the chord. The theory, ingenious as it is, fails to show that the musical intervals correspond to the visible points of division of the figure; and also that Mr. Hay's diagram does not agree with the Greek Canon. One-tenth, one-eighth, one-sixth, one-fourth, three-eighths, one-half, successively marked off on a vertical line, give the primary divisions of the full-grown figure; but the musical scale does not accord with such a division.

Mr. Story, in his "Proportions of the Human Figure," takes the relations existing between the square, triangle, and circumscribed circle, as the key to human symmetry; but mixes the subject up with references from cabalistic writers. Again, M. Bonomi, in a work published in 1856, gives a passage in Vitruvius which contains "almost all that is extant relating to the Canon of Polykletus"; and also describes Mr. Gibson's method for determining the leading dimensions of the figure. The diagram given is somewhat similar to Mr. Story's, though the circle connecting the square and triangle is inscribed. Mr. Gibson's diagram simply illustrates the well-known ratio between the diagonal and the side of a square, which is nearly that of 7 to 5.

Camper holds the first rank as a contributor to the philosophy of form. He insisted on the importance of an ethnological type. Other writers followed, as Audran, the French artist (1683), but they failed to throw much light upon their subject. Taking the head as a unit of measurement is open to objections. It is difficult exactly to obtain this unit except in the living figure; the hair prevents a nice discrimination in the solid sculptured figure.

It appears doubtful how far the Greek artists studied the proportions of childhood. It is pointed out as a remarkable fact that plastic art has passed through a series of historic phases, which correspond to those of Nature. The most ancient representations of the human form show disproportionately large heads. In the most ancient Greek relic in the British Museum, an alabaster figure attributed to the seventh century, B.C., the head and neck occupy one-fourth of the entire height. In the earlier Egyptian canon the head equals three-sixteenths of height. As sculpture progressed this proportion diminished. At the time of Polykletus the proportion was determined at one-eighth. Lysippus still further reduced this proportion later on. In the Venus de Medici the head is shown at a little more than the ninth part of height, a diminution which gives a doll-like and unpleasing effect to the exquisite symmetry of the figure.

The canon adopted by Phidias is not absolutely known, his figures being designed for elevated positions, as the frieze of the Parthenon, and so required a simple geometrical correction; applying this correction, the figures of that frieze are found to approach very closely the canon of Polykletus, and the figures in the frieze of the Mausoleum (90 years later) are identical in proportion to those of the Parthenon.

We know that architecture presents also a similar change of proportion as that which occurs in natural growth. Thus we have the squat Doric pillars of the Temple of Corinth about four diameters, and those of the Parthenon about six diameters, while in the Temple of Delos it is seven. The other orders display still more this gradual diminution of bulk, till we find in the Erechtheum a proportion of ten to one.

On some Egyptian tombs are to be found the draughtsman's rough squares of the proportionment of his figures, and exact scales are indicated. Thus in the 5th dynasty of kings, 3,400 years before Christ, the artist took nineteen equal squares as the height of his figure: the head occupies three, or nearly a sixth part of the statue;

a breadth of six squares is given to the shoulders, two to the waist; the figure below waist was equally divided for the trunk and legs. Later on in the sculptural era of the 20th dynasty (600 B.C.) twenty-two squares were given to the height, and the proportions verge on later-born Greek art. Thus we find strength and majesty typified in the bulk and proportions, as in the colossi of Rameses III.

As the writer says, all these methods and canons give no simple common measure as a unit, and we have no universal means of comparison or scale. No modulus can be taken at once so exact and simple as the height of the human figure. Now the division of this natural modulus is simple. Thus the cubit, or length of arm from the elbow, is an ancient dimension, and is exactly the fourth part of the height of a symmetric figure. This cubit, in the ancient scales, is divided into six palms, each palm into four digits. Now, by further dividing the digit into ten lines, we obtain a more delicate scale, yet a most simple, accurate, and autometric one, applicable to any figure, viewed at any distance. "The leading dimensions are indicated by natural terms; while the total number of 960 lines possesses the singular advantage that it is divisible not only by 2, 3, 4, 5, 6, 8, 10, and 12, but also, within one (that is to say, within .075 of an inch in a figure 6ft. high), by seven. No geometric diagram affords a mode of determining proportions so ready and exact."

By this autometric scale the laws of symmetry are clearly expressed, and every ancient and modern canon is capable of being reduced to it. Again, we are told, "If we represent one of the miniature bronzes of the British Museum, of 9in. in height, by a line half an inch long, the comparative stature of the Theseus from the Parthenon will be represented by a line of 5in." Every famous work of Greek art will range between these limits. Further, it gives proportionate, not actual, size, and this division of the figure is equivalent to the judgment the correct eye can form of its symmetry. Thus the confusion of different metrical systems is obviated; for instead of saying the Venus is seven and three-quarter heads high, we simply note that the head of the statue is so many 960ths parts of its own length, or 95 lines. The dimension can be referred to the canon, which gives 120 lines as the normal height of the head; and the heads of the Theseus of Phidias and the Venus of Milo are within a couple of lines of this proportion. Those on the Parthenon average 146 lines in height.

Again, the correction to be made for the foreshortening of figures viewed at an angle is readily ascertained as a proportionate quantity. Thus we can compare at a glance the early, mature, and declining canons of art, the principles of Egyptian, Indian, Assyrian, Greek, and Italian sculptors. "The relation between the most beautiful figures of the Renaissance, as limned by Raffaele, by Correggio, and, above all, by Leonardo da Vinci, and the proportions of the Cupid of Phidias, and of the Cupid and the Psyche of Praxiteles." We append the table given denoting the chief symmetric proportions of the human figure expressed in aliquot parts, and also in autometric lines. This table includes and completes the proportions cited by Vitruvius as those of the Canon of Polykletus. The coincidence is exact, but one exception is pointed out. Vitruvius's canon places the underside of the patella at 24 digits, or one-fourth of whole height. Actual measurements from the antique increase this dimension by from one to two digits in the male, and from two to three in the female.

It has been a general idea that the limbs are differently proportioned in the two sexes. In the Greek examples the difference is not in proportion of the limbs to trunk, but in that between the leg and thigh. So mathematically correct was the sculptor's work in the purest Greek art that if we find one or two dimensions to agree with the canon we can restore the remainder. Thus, the female torso of the Richmond Venus accurately accords with the canon, and it is easy to determine

the height of the original statue (if erect) at 66in., or 3in. taller than the Venus de Medici.

Not only was vertical symmetry reduced to exact rule, but the girths or horizontal dimensions are not less exact in the Greek sculpture. Da Vinci has shown that "All the parts of any animal must be correspondent with the whole; so that if the body be short and thick, all the members belonging thereto must be the same, as short arms, thick short fingers, &c." Thus there is a relation between the vertical and horizontal proportions of the figure.

"The modulus or unit of girth is the length of the foot," and measurements of examples have shown this to be exact. In the graceful form of the Venus of Medici, and the more massive Venus of Milo, the girth of the waist is three times the length of the foot, although the lengths of the feet vary in the two figures. It is noticed there is a geometrical propriety in this modulus. The most stable equilibrium is when the feet coincide in position on the ground with the sides of an equilateral triangle. When the altitude of this triangle equals the height of the head, or one-eighth of the stature, the side is equal to one-seventh. This is the lightest proportion given to the foot. By this modulus the leading horizontal measurements are regulated.

One great value is claimed for this autometric scale, namely, that it enables the student to refer to photographs of the Antique, at least as regards relievi figures in coins, gems, as cameo and intaglio. The same canons of proportion have been followed for at least a hundred and twenty years in the brightest period of Attic sculpture; even when various and very opposite characteristics have been given—as in violent combat and tranquil procession.

TABLE OF SYMMETRIC PROPORTIONS.

Heights of Figure.	From Ground.		From Crown.	
	Lines.	Parts.	Lines.	Parts.
M. To crown=4cubits	960	1	0	0
" top of forehead	936	39-40ths	24	1-40th
" centre of eyes	900	15-16ths	60	1-16th
" chin.....	840	7-8ths	120	1-8th
" forehead.....	800	5-6ths	160	1-6th
N. " point of nip- ples, 3 cubits	720	3-4ths	240	1-4th
" end of femur..	660	11-16ths	300	5-16ths
" navel.....	600	5-8ths	360	3-8ths
O. " Os pubis....	520	13-24ths	440	11-24ths
" end of trunk } = 2 cubits	480	1	480	1
" ditto, seated ..	460	25-48ths	500	23-48ths
P. " under side of patella ..	260	13-48ths	700	35-48ths
" centre of ankles	96	1-10th	804	9-10ths
Quo stat. ....	0	0	960	1

TABLE OF PROPORTIONATE GIRTHS.

Lines. Parts.		Lines. Parts.	
Little toe..	32 1-30th	Chest ....	548 4-7ths
Great toe..	48 1-20th	Shoulders ..	548 4-7ths
Ankle ....	120 1-8th	Neck .....	192 1-5th
Calf .....	222 2-9ths	Head .....	320 1-3rd
Knee ....	206 3-14ths	Arm .....	177 1-6th
Thigh ....	320 1-3rd	Wrist .....	96 1-10th
Loins ....	548 4-7ths	Thumb ....	40 1-24th
Waist ....	411 3-7ths	Little finger	24 1-40th

Mr. Burchett, the head master of the South Kensington School of Art, has devoted much labour to the production, by photography, of choice gems, magnified 64 times. We thus discover an artistic exaggeration of parts which is capable of metrical determination. The exaggerated parts, which only accentuate the drawing in the gem and give expression, become in a print of 8in. by 6½in. "positively shocking." Thus, the proportions of the Theseus in the beautiful gem in the British Museum, appear when magnified by the camera, to be those only proper in full-size sculpture to a child of between seven and twelve years. We see, therefore, in microscopic art the reproduction of a second childhood, and we derive a valuable lesson from this, namely, that the proportions of symmetry should be regulated by the size of the figure, as Nature herself points out in the normal types of childhood and old age.

A new Plymouth Brothers' Gospel Hall is being erected in Newnoundland-gardens, Bristol, at a cost of £1,100. The style is Italian. Messrs J. and S. Gorvett, of Bristol, are the builders.



## LECTURES ON ART AND ARCHITECTURE.—III.\*

BY ALEXANDER THOMSON, I.A., ARCHITECT, GLASGOW.

*(Concluded from page 107.)*

**B**ETWEEN these columns are three windows, which have served as models for us in nearly every street-house that has been built in Glasgow during the last sixty or seventy years, and which are likely to be copied for a good many years to come. But the most striking member of the group is the Pandrosus, in which female figures are used instead of columns. These are called Caryatides, and, although admitted to be very beautiful in themselves, their application to this purpose has been severely criticised. It is said that the bearing of such a load as the entablature evidently is inconsistent with the delicacy of the female form, and that it is repugnant to the best feelings of our nature to see women, whom it is our pride to honour, represented as doing work fit for only beasts of burden or slaves. This may be all quite true, and perhaps is a very good reason why those who think so should not repeat the offence; but the fact remains that the composition is singularly graceful, and that these ladies do not seem conscious of any degradation, but the reverse. They bear what may be supposed a canopy of some kind, with the easy grace with which the milkmaid bears her pail. This entablature furnishes another instance of the flexibility of Greek genius, and of the variety of which Greek architecture is capable. In Egyptian architecture we have human figures standing in front of square piers, but without carrying any load. In the great temple at Agrigentum, in Sicily—which is a somewhat coarse example of the Doric style—there are colossal figures of very good design, which stand in front of the piers forming what may be termed the clerestory. Their arms are raised so as to bring the elbows level with the top of the head, which is thrown forward, and the hands are clasped at the back of the neck. In this position they are made to carry a projecting portion of the small upper entablature—probably meant to give apparent support to the beams of the roof. If the figures in the Pandrosium had been aided by piers in this way, the objection would have been avoided; but, on the other hand, the beauty of their forms would have been greatly marred and much concealed by the mass of these piers. Looking at this building as an architectural design, it may be said that if the perfect unity which is exhibited in the Parthenon be so incontestably right, and therefore to be adopted on all possible occasions, the extreme irregularity which characterises the Erechtheion must be entirely wrong, and ought to be avoided. But it will be observed that the principle of irregularity is not recognised and followed throughout the whole building. It does not extend to the details, but merely to the disposition of the principal portions—which may be regarded as so many distinct and comparatively complete individual objects, brought into juxtaposition so as to form a group, rather than as members of a single organised body. We see an illustration of the principle on a larger scale in the general view of the Acropolis, in which the Propylæ, with its wings and stairs, the small Temple of Victory, the very irregular lines of the battlements, this Erechtheion, and the gigantic statue of Minerva, all clustering round the majestic form of the Parthenon, form an architectural group of unrivalled beauty and interest. In fact, the principle is the same as that followed in composing a group of figures in sculpture or in a picture. Each figure is symmetrical in itself; and, as we know it to be so, we do not feel called on to examine curiously each of its members. The figures individually are thus easily comprehended by the perceptive faculty; and, being arranged in various positions and attitudes in harmonious contrast, are presented to the æsthetic faculty as a variety of distinct objects in artistic combination. The Propylæ affords an example of a Greek building in which the unity of the Parthenon was departed from, as inapplicable to the purpose that was to be served, but in which the irregularity of the Erechtheion was also avoided. The Citadel or Acropolis of Athens was a fortified rock rising from the middle of the city, somewhat like the castle rocks of Edinburgh and Stirling. Precipitous on all sides except one, and that so steep as to require a zigzag road for

horses and chariots and stairs for pedestrians, the Propylæ stood at the top of this ascent and formed the entrance to the Acropolis. The principal feature consists of a double Doric portico, or rather two porticoes, for they are in different levels, standing back to back, one looking inward to the Parthenon, the other outward over the city. Two small buildings, which are supposed to have served the purpose of lodges or guard-houses, are placed one on each side, forming wings. Their fronts, which look towards each other, are composed of three small Doric columns in antis. There is a good deal of peculiar treatment about this building, showing how easily the Greek architects adapted their style to suit every circumstance. I shall point out some instances. Being on the slope of the approach, the inner and outer porticoes are on different levels. The centre intercolumniation is a half wider than the others, so as to give room for a roadway for chariots. (This deviation from the ordinary rule is observable also in the Doric portico supposed to have been the entrance to the Agora, or Market-place.) Between the two porticoes is a wall, with five gates, corresponding to the intercolumniations. A flight of steps on either side of the sloping chariot-way makes up the difference of level between the two porticoes. The roof of the outer portico is supported on two rows of Ionic columns, three in each row. This very unusual, and, in ordinary circumstances, very bad, arrangement of three columns is resorted to twice in this building. The row of three Ionic columns, being in the interior, cannot be seen from such a distance as to admit of the objectionable nature of the arrangement being felt; and, in the case of the three columns in the wing fronts, the one next the main wall is in a line with the columns of the portico, so that the intercolumniation is opposite the side space of the portico, and thus only two of the columns are seen from the open space in front. But, notwithstanding these peculiarities, the design was perfectly symmetrical in composition. It is remarkable that all the buildings on the Acropolis are set at different angles, and in this way each served the purpose of a foil to the others, and each required separate inspection for its particular merits. The small temple of the Wingless Victory on the one side of the approach, and a large pedestal, supposed to be for an equestrian statue, on the other, are so close to the Propylæ as to be included in its effect, but they are set at different angles to each other and to the principal structure.

While we are speaking of these peculiarities of Athenian architecture, I may call your attention to another example in which three columns were used in an unobjectionable way. I refer to the Choragic monument of Thrasylus. This monument is a mere frontispiece to a cave rudely hollowed out of the rock of the Acropolis, and consists of three square columns or piers, supporting an entablature and attic. The general character of the detail is Doric. But, instead of the frieze being divided into spaces by triglyphs and sculptured metopes, it is decorated with wreaths of laurel of a somewhat naturalistic type; and instead of the band between the architrave and frieze, which, with six guttæ or drops under each, usually supports the triglyphs, there is a band with these drops in a continuous line, making a very simple and effective decoration. Over the entablature is what is termed an attic, the treatment of which is very unusual; and upon this there is a statue sitting. But the most remarkable peculiarity of the design is the fact of three columns being used; and I have to point out to you the means by which the objection to this mode of arrangement is got over. Had the three columns been of equal breadth, and the mouldings of the attic continuous, the central column would have attracted undue attention, to the disadvantage of every other part of the design, and the statue above would have emphasised the centre still more, so as to make this portion appear in advance beyond the general line of the front. Now, observe what is done. The force of the centre is reduced by making the central column somewhat more slender than the side ones; and the preponderating power of the attic is lessened by leaving out rather more than a third of the length of the mouldings, substituting two plain steps instead. Upon this the statue sits, the soft lines of its limbs and drapery being thus relieved of the too violent contrast to which it would have been subjected had the mouldings been continued from side to side immediately

under it. All the parts are thus made to assume a just equipoise, whilst the various departures from ordinary modes of treatment give an interest to the design which could scarcely be expected from it, considering the fewness of its parts, and the comparative smallness of its size.

Besides the Doric and Ionic styles, the Greeks had what is termed the Corinthian, of which there are only two examples. This style is more ornamental than the Ionic, and still farther removed from the severe dignity of the Doric. The plainest example is found in the doorpiece of the building called the Tower of the Winds. I will not describe this building at length, but I would state that it affords another proof of the flexibility of Greek architecture. It is quite unique in form and proportion, and is possessed of very considerable merit in plan. Indeed, if the details had been more refined, it would have taken a high place amongst the buildings of antiquity; but it does not belong to the best period of art. It is octagonal in form, having the figures of the eight winds, with their symbols, sculptured upon its several faces near the top of the wall. It was roofed with marble, and on the apex there was the figure of a Triton, turning on a pivot, with a rod in his hand, which pointed downwards to the figure of whichever wind might be blowing. Under the winds each face had a sun-dial drawn upon it, and in the interior was a clepsydra, or water-clock. What we have chiefly to do with is the columns of the doorpieces. These are a kind of Corinthian, of a very simple and good type, but, like other Athenian examples, very small, the column being under fifteen feet in height over all. The shaft, like the Doric, has no base. The capital is bell-shaped, with two rows of leaves; the first, or lowest, is raffled, like the leaf of the Roman Corinthian; the second is composed of what are called water-leaves—long, smooth, sedge-like leaves, sharp-pointed, and without being serrated. This capital presents a most pleasing and simple harmony, such as may be used without incurring the necessity of much general ornamentation in the surrounding parts.

The other example of Greek Corinthian is the Choragic monument of Lysicrates, "which," says Mr. Fergusson, "notwithstanding the smallness of its dimensions, is one of the most beautiful works of art of the merely ornamental class to be found in any part of the world." This is Mr. Fergusson's opinion of its merit; but he has an implicit and unwavering belief in his own persuasion that, whatever the Greeks could do in refining any form to a high degree of artistic excellence, they were not equal to the invention of the rude original. And so he tells us, as if it were a matter of ascertained fact, that "the Corinthian order is as essentially borrowed from the bell-shaped capitals of Egypt as the Doric is from their oldest pillars. Like everything they touched, the Greeks soon rendered it their own by the freedom and elegance with which they treated it. As in everything else, however, the Greeks could not help betraying in this also the Asiatic origin of their art; and the Egyptian order with them was soon wedded to the Ionic, whose volutes became an essential, though subdued, part of this order. It is, in fact, a composite order, made up of the bell-shaped capital of the Egyptians and the spiral of the Assyrians." I quote this chiefly that I may have an opportunity of reiterating my disapprobation of this very small way of accounting for great things, and to ask you to consider how absurd it is to assume that every fine thing which the creative faculty of the Greeks has produced must necessarily have been copied from, or suggested by, some crude material object, invented long before by the primitive workmen of Egypt or Assyria, while indulging their quaint untutored fancies. It would seem as if Mr. Fergusson considered the great merit lay in the contrivance or the first rude shape rather than in the perfecting and imbuing with thoughtful life the finest form; and, by inference, that it is more hopeful for art that we should study those embryotic shapes, with the view of working some improvement upon them, than that we should draw wisdom and inspiration from the highest achievements of the most accomplished artists, and endeavour to attain to the high standard of excellence which they have set up for us. Were it not for these persistent attempts, not merely to diminish the distance that lies between rudeness and excellence, I should not have thought it necessary to remind you that architectural design consists in moulding and adapting forms and lines into harmonious propor

\* D livered at the Glasgow School of Art and Haldane Academy.



tions and combinations, by the exercise of the æsthetic faculty. Forms which do not possess these qualities cannot be regarded as in anywise connected with art; for it is the spirit, and not the body, that we look to as a means of enlightenment and as a source of enjoyment. But it is only the capital of the column that Mr. Fergusson recognises as corroborating his favourite theory of architectural succession, and that is a comparatively small member of this singularly beautiful object, which, he tells us, is one of the most beautiful things of the kind in the world. In fact, the whole thing is so small, so elegant, and so exquisitely elaborated, that it is rather to be regarded as an architectural flower than as a building. In form and composition I believe that it has no prototype in either Egypt or Assyria; and I suppose Mr. Fergusson is also in this belief, or he would have told us of it plainly enough. It is a circular monument, about eight feet in diameter, with six columns, having the intercolumniations filled up so as to leave the columns projecting a little more than half, except at the top. It stands upon a high square base, and has no door, or any other opening. From the neck of the capital, all over the roof, and up to the top, it is one blaze of the most beautiful ornamentation ever conceived by the imagination or executed by the hand of man. Indeed, it seems to be either the type of what we know as Greek ornament, or its most perfect masterpiece—a standard of emulation to the accomplished artist, a source of education to the advanced student. Mr. Fergusson, looking at the capital of the column as the only part that he can make anything of, says, "it is, in fact, a composite order, made up of the bell-shaped capital of the Egyptians and the spiral of the Assyrians." Now, what resemblance he can trace between the solid leaves in low relief upon the Egyptian lotus or papyrus capitals and the freely-relieved, deeply-incised acanthus leaf, intermingled with flowers, which we see here, or between the rude nondescript scrolls of the Assyrian and the elegant combination of leaves, tendrils, and flowers in the upper part of this capital, I cannot comprehend. There are, doubtless, leaves in the Egyptian capitals and scrolls in the Assyrian, and both in this of the Lysicrates monument. But there are many animals, which resemble each other in having heads and tails, that are nevertheless so very distantly related as to require much research and subsequent speculation to establish even a remote degree of kindred. And we are driven to the conclusion that the recognition of relationship in this instance either affords evidence of the great keenness of Mr. Fergusson's critical vision, or a strange suspicion of his blindness.

There are other examples of the Corinthian style in and around Athens, but as these belong to the Roman period, and exhibit the peculiarities of the Roman manner, they need not be noticed here.

To the ordinary observer Greek architecture seems a very simple thing, in which balance of parts and regular repetition are the most apparent peculiarities; that it was all very well in its way, but as regards construction it was extremely primitive and unskilful. And some good-natured folk believe that, as the Greeks were a very clever people, they might possibly have made something of their architecture if they had only known the use of the arch. It would take more time than we can at present spare to describe the peculiarities and capabilities of the arch as an artistic form. It will come up as a prominent part of our subject in treating of Roman and Mediæval Architecture. But I may state that the reason why the Greeks did not use it as an artistic form was not that they were ignorant of it. Arches were far more numerous in Egypt than proto-Doric columns; and in Assyria, the land of scrolls, it was used as an architectural feature, but the Greeks rejected it simply because it did not suit their purpose, or, to speak more strongly, because it was diametrically opposed to their purposes.

I have stated that the striking peculiarity of the Greek mind was a desire for excellence in whatever pursuit it thought worthy of its efforts. In artistic forms the Greeks aimed at ideal perfection; and, so far as we can comprehend the matter, they attained it. By the introduction of the arch into architecture the whole thing underwent a radical change. While the Egyptians and the Greeks bestowed their chief attention upon the solid parts of their buildings, the Romans and Goths adopted the openings as the principal

objects of their concern. Now, it will be observed that, whereas the column is susceptible of being adjusted to the nicest proportion and the highest degree of the refinement of form, the arched opening, or void, is extremely limited in these respects. And neither in proportion nor outline has it ever assumed even the most distant approach to the degree of excellence to which the column attained under the Greeks. But it is not merely rude and intractable in itself; it never has been, and never can be, associated with those refinements which have been observed in the column and other essential features of Greek architecture. I cannot notice these at great length, but would call your attention to some of them. Externally, the Parthenon appears as a simple unit; its form is about as easily comprehended as is that of a brick; its few leading features are bold and massive, and are noticed at a single glance. There is a stylobate of three degrees, a peristyle or surrounding row of columns, and an entablature. The entablature is composed of three distinct divisions—architrave, frieze, and cornice, with a pediment at each end. The material is white marble, and it is wrought with such perfection that no traces of the individual workman are to be seen. Indeed, it seems so perfect in all its parts that the idea of its being a human work does not occur to the mind of the beholder. The broad, massive character of its parts conveys an impression of light and joyfulness rather than of shadow and gloomy grandeur. The more formal features of the architecture are judiciously mixed up with the varied forms of sculpture; and the brilliant whiteness of the marble is relieved by gold, azure, and crimson. As we examine it more closely, the simplicity which struck us at our first impression gives place to a bewildering sense of the most subtle intricacy of composition, and the most exquisite refinement in detail. Indeed, some of the refinements are so extremely delicate that they escaped the very keen observation of Stuart and Revett, who were the first to delineate the Athenian buildings with any degree of accuracy. With a deep sense of the nicety of the task which they had undertaken, they provided themselves with the best instruments for minute measurement which the science of their time could produce, and they measured the detail to the thousandth part of an inch, but they failed to find out that lines which appeared straight were in reality all curved, and that so slightly that when the discovery was made, and the curvature of the lines began to be spoken of as something else than accidental—when it was asserted that the thing was deliberately done to correct optical illusion—ordinary men laughed at what appeared the ridiculousness of the idea, and wise men received it with incredulity. But when the matter came to be investigated, it was found that it was not peculiar to one, but common to all the buildings of the true Greek period. The apparently horizontal lines of the Parthenon are found to be curved upwards. The uppermost line of the stylobate measures in front about 101 feet, and the curvature in that length is a little less than three inches. That on the entablature is somewhat less still, and it was evidently intended to counteract the influence of the pediment, increasing in height, as it does, from the sides towards the centre. The length of the flank is about 228ft., but the curvature on this—a length more than double that of the front—is almost the same, and the reason why it is not also double is evident. It was still the influence of the pediments that had to be met, although in a different way; for, looking along the flank from either end, the peaks of the pediments were so emphasised that the horizontal lines of the stylobate and entablature would certainly have appeared as deflected downwards below the true level. Then the columns were found to be curved, not merely in proportion to their height, but, as they are slightly inclined from the perpendicular, backwards from the front and inwards from the sides; and thus this curvature, or entasis as it is called, becomes extremely complicated and delicate, as it must vary gradually from the greatest to the least. This slight inclination of the columns is also a wonderfully fine provision against apparent weakness. It would be tedious to follow all the delicate corrections that have been observed on the Parthenon and other buildings; but take, for instance, the degrees of the stylobate of the Parthenon. These are not equal in height, but increase slightly as they rise, the second being about half an inch higher than the first, and the third about an inch higher than the second. There is even a measurable difference in the whole

length of the upper and lower lines of each of these degrees. I have now to call attention to the perfect harmony that is observed between the architecture and the sculpture of the Parthenon; and, while it is greatly owing to the fact that the same law of proportion governs both, there is also the fact that all the mouldings of the Doric style are of a fineness corresponding to the gentle swellings and depressions of the muscles of the human frame. What a long history of refinement do we see indicated in the curve of the echinus of the capital, the succession of thin, sharp fillets at the lower part of it, and the narrow channels marking the neck of the column. The flutes are flat, elliptical hollows, with a very narrow and almost invisible fillet between them. The members of the entablature, though mostly angular, are so varied between boldness and extreme tenderness of projection that the average leaves a pleasing impression of softness upon the mind quite in keeping with that quality in the sculpture. The sculpture which decorated this building is the finest in the world, and, strange to say, the marvellous frieze representing the Panathenaic procession occupied a position in which it could barely be seen—certainly not to advantage. And the back of the figure, called the Illisus, which Canova and Flaxman declare to be unrivalled, was turned to the wall of the tympanum, and never seen by mortal eye from the time that it was put up under the direction of Phidias until it was taken down under the direction of Lord Elgin. But the Greeks did not do these things merely to be seen by man, for they said, "The gods see everywhere."

Before leaving this subject, I would ask you to turn and look for a moment at the Acropolis of Athens, as it appeared when Greece was the light of the world. A great rock arises from amidst the widespread city. Its battlemented walls follow the irregularities of the precipice, here assuming the shape of a tower or bastion, there some form of grace which suggests a sacred purpose. But the chief objects are the Parthenon and its companions. And now let us shut our eyes to all outward things, let us draw a curtain over whatever architectural combinations of gorgeousness or of gloomy grandeur that may have found place in the gallery of the imagination, and let us gaze with the eye of the soul upon this most wonderful sight. John saw "the Holy City, new Jerusalem, coming down from God out of heaven, prepared as a bride adorned for her husband." What do we see here? A group of beautiful forms, so full of thought that they seem to think. They seem possessed of some high, contemplative, rapturous kind of life altogether different from any of the ordinary or natural sorts. We see no indications of progressive development as in plant life, no motion as in animal life; they neither move nor are moved, but sit upon that rock as upon a throne, high and lifted up in the sight of all the people, in the sight of all the gods. The resplendent whiteness of the marble, rendered still more glorious by the blaze of light which seems to envelope them as if the sun delighted in pouring his brightest rays upon that assemblage of angelic forms, that holy sisterhood standing as mediators between earth and heaven, sending upwards the prayers and praises of men, and drawing downwards the approbation and blessing of the eternal gods. The majestic Parthenon, the graceful Erectheion, the guardian Propylæ, with its extended wings, and by its side the little Temple of Victory—fancy all these beautiful forms composed of marble of pearly whiteness, and the azure, crimson, and gold with which they were partially tinted, seen from a distance. The colours, blending with the white, would yield a chaste irradiance resembling that of the opal. Then, suppose the colossal figure of Minerva, whom the Athenians delighted to honour, standing in the midst leaning upon her spear with her hand raised pointing to heaven, and we have one of the most glorious sights which the human eye has ever been permitted to behold, and the like of which it will never again see in this world.

St. James's Chapel, Brighton, has been entirely demolished, and the altar has now been sold, and is used for a taproom table in a Brighton beershop, and the stalls which were occupied by the choir are doing duty at a neighbouring eating-house.

The appeal for funds for the restoration of Rochester Cathedral having been liberally responded to, a new part of the work has been entered on—the restoring of the exterior of the south transept.



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## ILLUSTRATIONS.

SHOP AND STAIRS IN HOUSE AT ST. LÔ  
(SKETCHED BY E. W. GODWIN)—ST. GILLES,  
NEAR ST. LÔ (SKETCHED BY E. W. GODWIN)—  
CHIMNEY-PIECE, HOLMEWOOD HOUSE—FIRE-  
PLACE, MOOR FARM, SUSSEX—NEW CHURCH  
VICTORIA PARK, MANCHESTER—GERMAN,  
SPANISH, AND FRENCH SCULPTURES

## OUR LITHOGRAPHIC ILLUSTRATIONS.

MR. E. W. GODWIN'S MEASURED SKETCHES.  
SHOP AND STAIRS IN HOUSE, ST. LÔ.

THE upper town of St. LÔ still possesses, to the west of the cathedral, some interesting examples of domestic architecture. A few are of timber, and the best are illustrated in Plate 47 of Nesfield's Sketches. There are a fair number of stone houses, mostly very plain, and of a late date, but not wanting in picturesqueness. Some of these are street houses, evidently built for trade purposes; others are private dwellings, with courtyards and gardens. Both kinds enabled me to contribute two illustrations in the BUILDING NEWS of May 29. The stairs are of oak and tile, in six flights; the newel posts are 6½ in. square; the balusters (not of good form) 4½ in. square, and 11 in. from centre to centre. The great charm of this example consists in the treatment of the panelled soffit of each flight, both in its arrangement of panels and its mouldings. The beauty of the last cannot be appreciated, as the reduction of my drawing by photo-lithography has resulted in an uncertain outline. The house is of the seventeenth century. The owner is, I am glad to say, proud of his possession, and of a most obliging disposition.

The other illustration from St. LÔ is interesting as being an untouched example of a stone Mediæval shop. The jointing of the masonry is a study by itself.

ST. GILLES, NEAR ST. LÔ.

In the number for July 3 are some sketches from St. Gilles, a village on the road from St. LÔ to Coutances. The windows of the nave and aisles are single lancets, with the exception of those in the two eastern bays of aisle, of one of which I give an internal elevation. It has a charming effect of combined greatness and simplicity of design, or, perhaps, more truly speaking, greatness resulting from simplicity. The nave piers are singular; the double shafts and vaulting shaft to aisle are of the same height (in one pier they are all five carried on corbels); the vaulting shaft to nave is, as usual, much higher. This singular effect results from the double shafts carrying, not a compound arch of two or three orders, but two perfectly distinct rib-like orders of a semi-octagonal section, and from the great thickness of the pier. The courses of masonry vary from 6 in. to 8 in.

The subjects of the illustrations in this number are a twelfth-century chimney in the domestic buildings of the Priory of St. Gabriel, near Bayeux. A kitchen andirion, or *landier*, as the French call it, still used in the Chateau of Ouilley de Houley, near Lisieux, and the staircase of the farm at Mesnil Manger, near Mezidon, of which a small illustration is given at p. 225 of De Caumont's "Abécédaire," 1853. Of the view as drawn by Bouet scarcely anything of the near buildings exist except this staircase. The pigeon-house is gone, the moat has become a narrow ditch, and last year they were sawing up for firewood the carved beams of buildings that had been pulled down because the proprietor could not afford to use them or keep them in repair! Originally most of the timber work here and in this district was covered with shingles or tiles—sometimes still to be seen in detached bits; but in most cases they and their laths have been removed on the same principle that actuated the proprietor of Mesnil Manger to make firewood of his carved chambers.

CHIMNEY-PIECE, HOLMEWOOD HOUSE.

Our illustration gives an elevation and section of an oak chimney-piece executed for the dining-

room of a mansion at Holme, near Peterborough, now being completed for W. Wells, Esq. The panels over the fireplace opening and in the cove under the cornice are carved. The sides of the fireplace and the hearth are lined with tiles of a mottled-green colour, a slip of moulded marble being carried round the opening to finish against the oak. The centre of the upper part was designed to receive a painting by Sir Joshua Reynolds, which fixed the size and shape of the panel. A brass scone is fixed on each side on the face of the pilasters. The work has been carried out from the designs of the architect, Mr. W. Young, of Exeter Hall, Strand. In a future number we intend to give an illustration of the exterior of this mansion.

FIREPLACE, MOORE FARM, SUSSEX.

The illustration by Mr. W. Penstone shows the fine and perfect fireplace in the large upper room at Moore Farm, near Petworth, Sussex. The house, of which only about one-half of the original now exists, once one of the residences of the Dawtreys family, has been much modernised; the garden front, however, remains in its original state. The room, containing the fireplace illustrated, is 32 ft. long, 22 ft. wide, and 13 ft. high, panelled throughout, the panelling and cornice being similar to that shown in the drawing. The chimney-piece bears the figures 1580, the date probably of the erection of the house itself. At one angle of the room is an enclosed lobby, of the same character as the fireplace, leading to the staircase, now destroyed. The ceiling has highly-enriched plaster panels with moulded pendants, the panels containing the Dawtreys crest, a unicorn, and an enriched interlaced pattern with fleur-de-lys terminations. There are two other rooms with enriched and panelled ceilings, and a half-timbered porch still existing.

The illustration is one of those prepared for a new work about to be published by Messrs. Longmans, entitled "A History of the Castles, Mansions, and Seats of Western Sussex," by Dudley George Carey Elwes, F.S.A., the illustrations for which have been made by T. Batterbury and W. Penstone, architects. Amongst the illustrations will be the following:—Amberley and Arundel Castles, Angmering New Place, Blackdown House, Barnham House, Chesworth House, House by Sir C. Wren, and The Priory, Chichester; Cowdray House, Halmaker House, Hill's Place, Horsham; New Place, Pulborough; Shulbred Priory, and Slindon House. The work will treat of no less than 157 different parishes.

NEW CHURCH IN VICTORIA PARK, MANCHESTER.

This church, as shown in annexed illustration, is designed to be executed in Darley Dale stone for dressings, and Yorkshire walling stone in random courses externally. Internally, the piers, arches, and other dressings will be of Houghton stone, and the walls faced with stock bricks. The ceiling will be in the form of a polygonal barrel, divided into panels between the semicircular ribs of roof trusses. Above the ceiling an airway is arranged for the ventilation of the building at night. This will be accelerated by a gas stove in a flue in the tower. The building is to be heated with hot air, by Messrs. Haden's process. Mr. Mark Foggett, builder, of Manchester, has undertaken the work at a total cost of £10,093, from designs by Mr. G. T. Redmayne, architect, Manchester.

During a thunderstorm at Edinburgh on Saturday, two small turrets of the crown of St. Giles Cathedral were destroyed by the lightning.

## THE PRESERVATION OF TIMBER.

THE method of preserving timber introduced by the Rev. Dr. Jones, to which we recently referred, was experimented with on Saturday afternoon, at the residence of Mr. W. C. Jarvis, The Priory, Tandridge, near Godstone, Surrey. Dr. Jones claims that his patent will not only avert dry-rot, but absolutely cure it, and render timber considerably less liable to the action of fire. The first experiment was tried on two pyramids, constructed by placing a large number of pieces of wood together, one being "pickled" with the preparation and the other unprepared. A pint of petroleum was placed on each, and whilst all that remained of the unprepared timber was the usual residuum of ashes, that soaked with the preparation remained almost intact. The next experiment was that tried on a barrel of the usual Government size, under the head of which was placed a quantity of gunpowder wrapped in a piece of tissue paper and then enveloped in brown paper prepared with Dr. Jones's solution. Though subjected to the heat caused by petroleum being poured over unprepared shavings, the gunpowder did not explode even when the flames were directed to the interior of the barrel. When taken out the gunpowder was found in precisely the same condition as it was prior to being subjected to fire. The third experiment was that of setting fire to two wooden houses, one being prepared by the process and the other not treated so. In the instance of the former, though subjected to the heat caused by a large fire being placed in the centre of the basement, the floor was but slightly charred; in the other, as might have been anticipated, the flooring was completely burnt, and had time been allowed the whole structure would have been destroyed. A fourth experiment was that of subjecting a wooden box of several inches thickness to the flames of a fierce fire for some fifteen minutes. When taken out the exterior of the box was but little charred, and on its being opened a parchment deed, to which a large seal had been attached, was found unharmed, the sealing-wax itself not presenting any appearance of having suffered from melting. After these tests of the efficacy of the treatment had been concluded, those present were shown a piece of timber taken from her Majesty's ship *Lord Clyde*, which had been restored from a state of almost pulp to its normal condition.

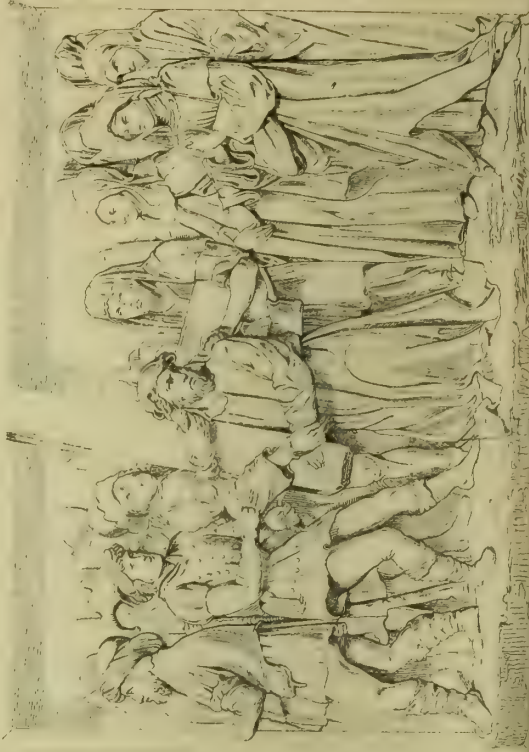
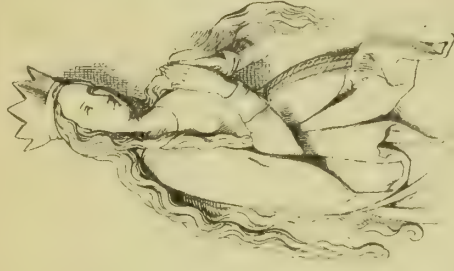
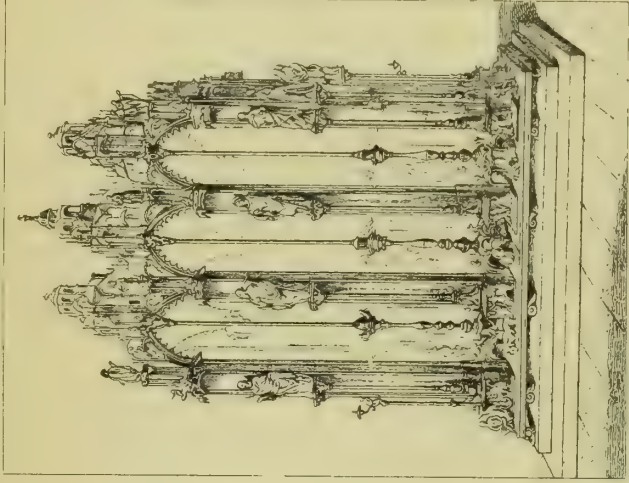
## ORIENTAL ART AND LITERATURE.

THE International Congress of Orientalists, which was initiated in Paris last September, will hold their second session in London, from the 14th to the 19th of next month. The object of the Congress is to bring together those interested in the language, literature, arts, sciences, and ethnography of the East, with a view to considering these subjects, and advancing their knowledge by the reading of papers and by public discussion. For the purpose six sections have been arranged. 1st, the Aryan Section, which is to be conducted under the presidency of Professor Max Müller; 2nd, the Semitic Section, over which Sir Henry Rawlinson will preside; 3rd, the Turanian Section, under the presidency of Sir Walter Elliot; 4th, the Hamitic Section, which is to be under the presidency of Dr. Birch, who is also the president of the Congress; 5th, the Archæological Section, to be presided over by Mr. Grant Duff, M.P.; and 6th, the ethnology, science, and products, natural and artificial, of the East, forming the Ethnological Section, under the presidency of Professor Owen. The mornings of the six days are to be devoted to visiting public and private collections of Oriental objects, whether books or works of art; whilst the evenings of the first four days are to be reserved for the reading of papers and the study of questions relating to Oriental languages and literature; the evening of the fifth day to the archæology, and that of the sixth to the ethnology and natural products of the East.













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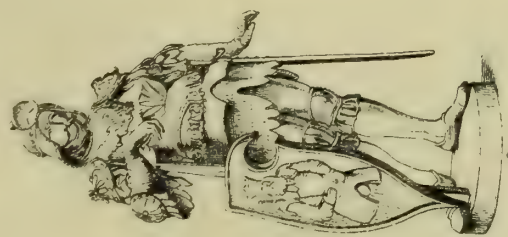
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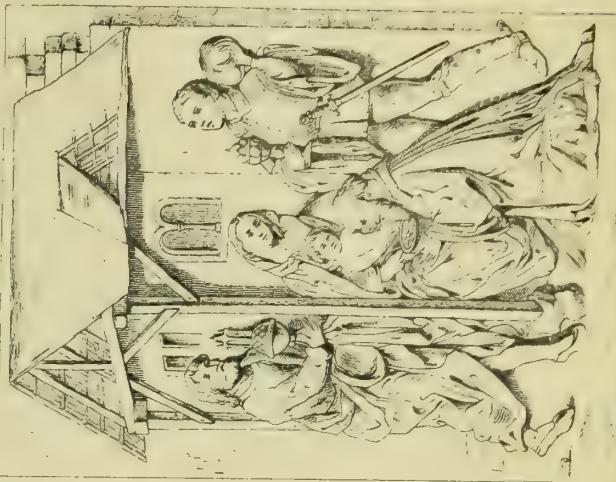
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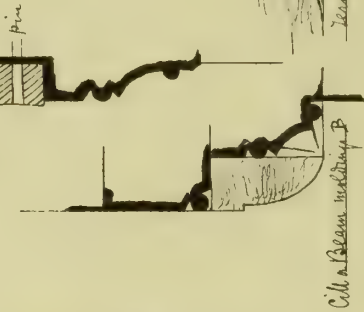




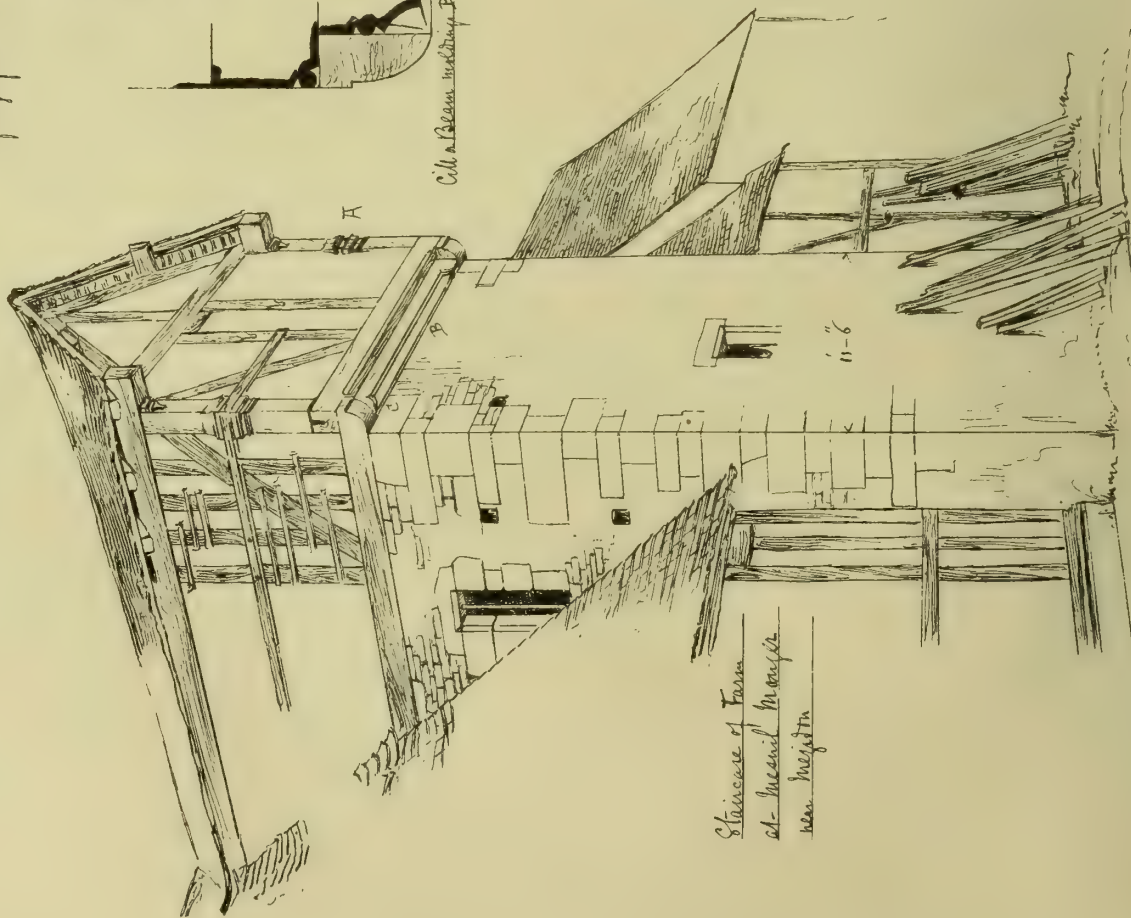




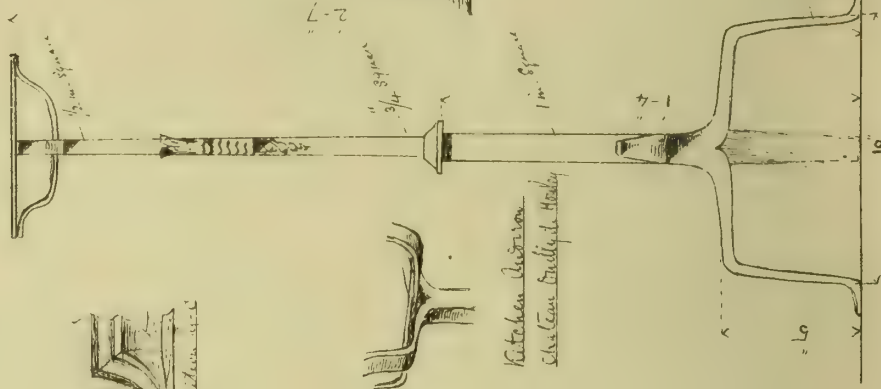
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of Angle post. A.



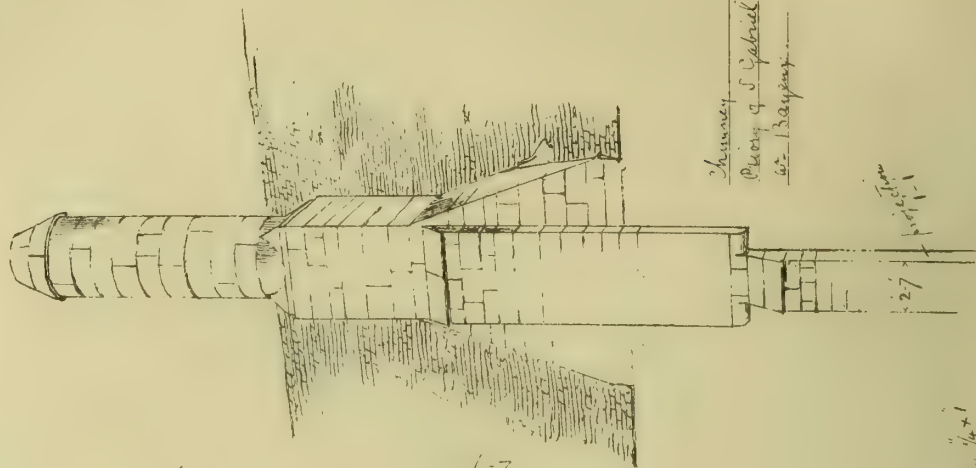
Cellar Beam and Roof B.



Staircase of Iron  
at Ince's Works  
near Wigan



Kitchen Partition  
showing Brickwork and Walling



Chimney  
Piering of S. Gabriel  
at Wigan

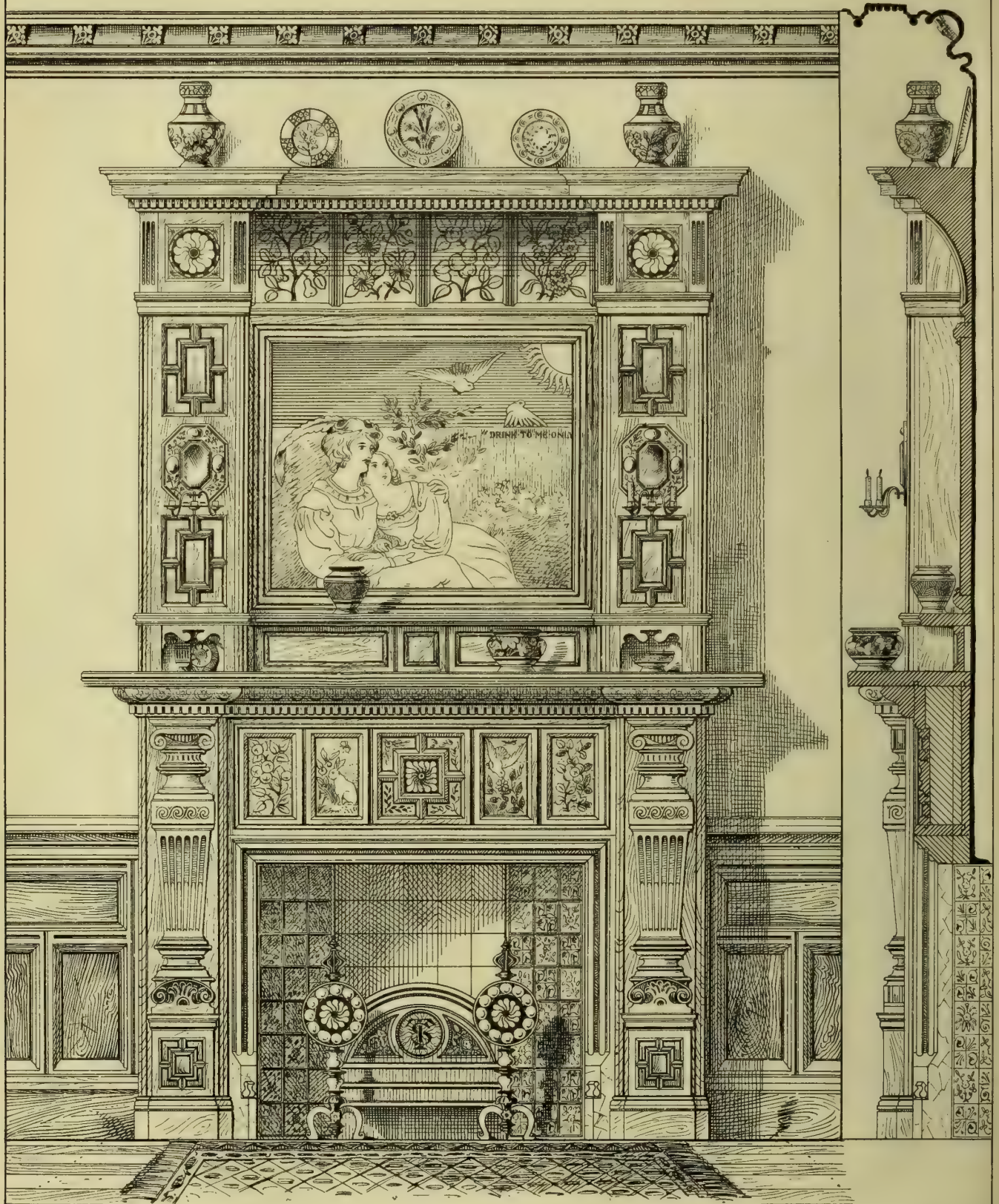
Edward T. Jeffries







· Holme · Wood · House · Detail · of · Fireplace · &c. ·  
· William · Young · Architect ·



· Elevation ·

· Section ·

· Scale · of · feet ·

Inches  $\frac{1}{2}$  6 0 1 2 3 4 5 6 7 feet.

DRAWING FINISHED BY  
MAURICE B. ADAMS

Photo-Lithographed & Printed by James Akerman 51 Gray's Inn Road W.C.



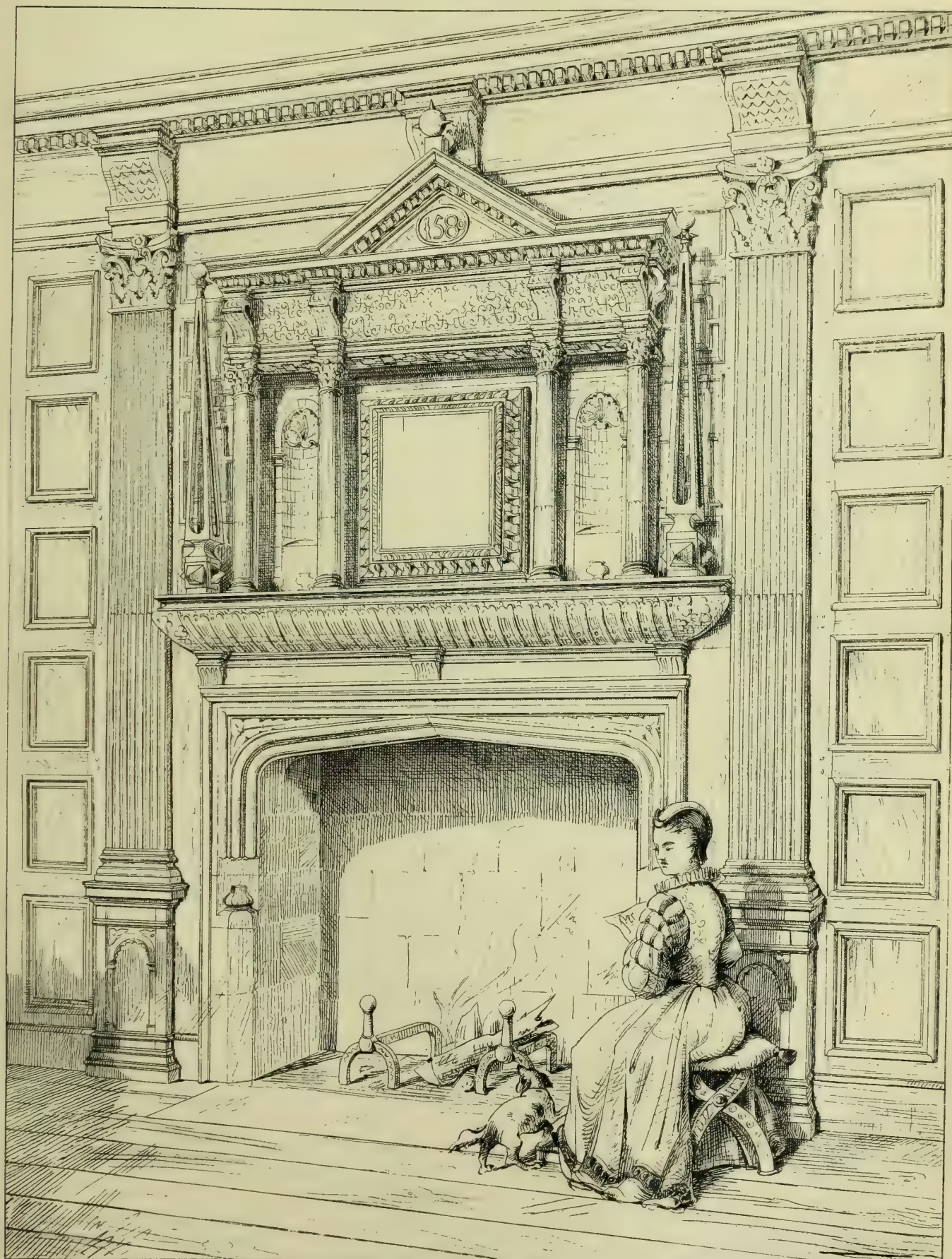


Photo Lithographed & Printed by James Akerman 51 Grays Inn Road W.C.

**CHIMNEY PIECE, MOOR FARM, SUSSEX.**

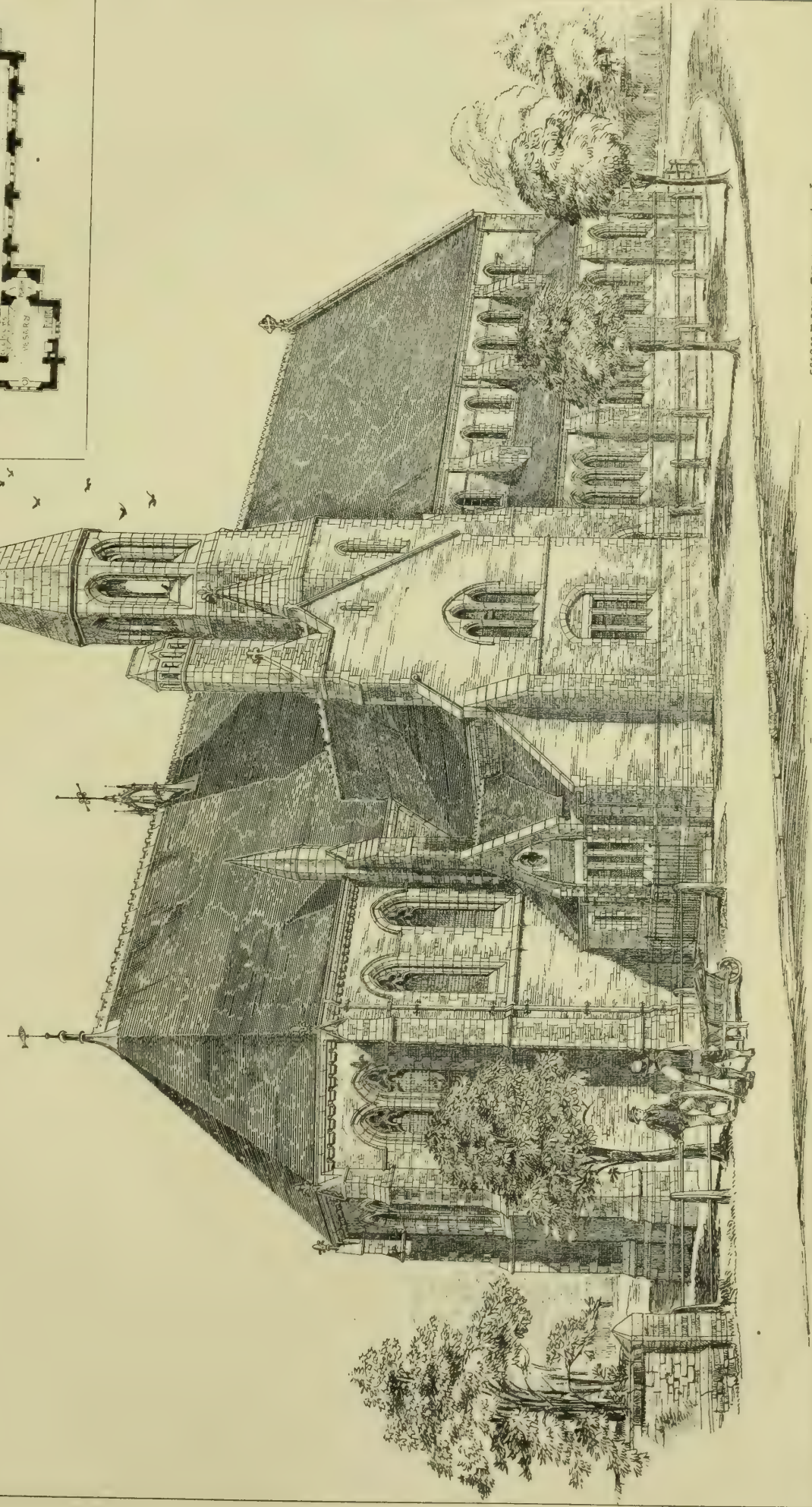
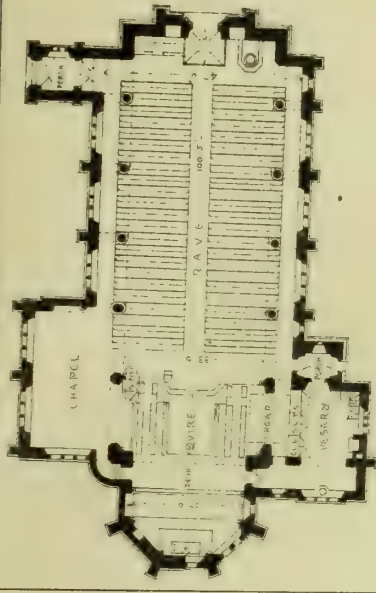
DRAWN BY WM PENSTONE.







⊕ CHURCH ⊕ IN : VICTORIA\* PARK\* MARCHESTER:









## THE BRITISH ARCHÆOLOGICAL ASSOCIATION AT BRISTOL.

ON Wednesday week, the unfavourable weather which attended the first day's proceedings still continuing, the members of the British Archæological Association made their first excursion. The breaks proceeded through Clifton, across the Suspension-bridge, on to Leigh, Mr. J. F. Nicholls, city librarian, and Mr. Taylor, of the Library Society, pointing out many objects of interest to strangers. The first spot at which the archæologists paused was Portbury, and here the small priory that had been founded for two knights of St. John of Jerusalem, and the camp, were descanted upon. The next place at which a halt was made was Clapton-in-Gordano, so secluded a village that it was only after many inquiries, and when the road had been missed, that the church, perched on a steep eminence, was discerned. Mr. E. Roberts, F.S.A., described some of the chief points of interest in the church, remarking that it seemed to him remarkable that nearly all the places close to Bristol had been less looked into than those at a distance. At all events, there was little known about Clapton, which had been shown by no one knowing exactly where the church was, or how to get to it. The party next proceeded to Clapton Court, which is not far from the ascent leading to the church. Some of the party went to Cadbury Camp. The next place on the route was Tickenham, which being reached, the archæologists crowded into the quaint little church, and listened to some remarks made by Mr. Roberts, who prefaced his statement by saying that he was informed there was very little known about the church, but it was dedicated to two saints, one very rare, viz., St. Julietta and her son St. Curiacos. The church was Norman, and the chancel similar to those that existed in the country at the time of the Conquest. The only part of the Norman church that remained was the wall in which the chancel arch had been built. The tower, which was Perpendicular, had been built against the old church; he could not say whether there was a tower before that one. The parapet of the chancel was a pure example and well worth examination. Tickenham Court was next inspected, and Mr. Roberts, who described it, said the building was now nearly in the state in which it was originally built. The shape of the entire building was that of the letter T. The greater part of the building could be referred to the time of Henry IV., but the windows of the hall appeared slightly earlier, though this was only the accident of a few years, and might simply have been through the sequence of the building. The party dined at the Royal Oak Inn, Nailsea.

Mr. Grover read a paper, which gave a history of early British fortifications, showing from maps that a range of twenty-six fortifications extended along the Mendips for the purpose of defending the Channel, the whole of the number running in a straight line, that of Cadbury forming one of the system. The speaker proceeded to say: "From the position of Sodbury camp, the most undoubted Roman work, on the crest of a lofty ridge whose steep slope is to the west, we see at a glance that the advance of the Roman army in the Claudian invasion was from south-east to north-west, and that the line of their approach was that of the same ridge of hills, extending north-east from Keynsham. By the position of the camps on the other (or Cadbury) ridge, we see the line of the defenders, who were falling back on the Bristol Channel and Wales."

Nailsea Church, which contains no object of particular note, was visited after the party left the Royal Oak, and then they were conveyed to Backwell, where they examined the fine church. Mr. Roberts said this was a structure that deserved more attention than could possibly be given to it at the present moment. There was a very curious thing well known to archæologists in connection with that church—viz., that there was an inclination in the line of the nave and chancel which was supposed to represent the leaning of our Saviour's body on the cross. As in most other cases they had observed to-day, the church as they now saw it did not represent the original structure. The tower archway of the porch was as early as the thirteenth century. There was also outside the chancel a string-course under the window, of the same period. The priests' door was likewise of that period. Except the Rodney Chapel, the rest of the church was of the fifteenth century. Perhaps the most singular part of the church was the Rodney Chapel, which was of the fourteenth century.

It was on the north side of the chancel, and elaborately screened off in front, and had a roof supported, speaking popularly, by scalloped stone beams, which although late, bore evidence of great skill, and were very beautiful. Though nearly all the work was of the fifteenth century, it was not of the same date. The church had been fitted on to the tower. The roof-tree of the nave did not come over the arch, and the chancel arch did not coincide with that of the other roofs, all showing a variation from the original plan when it was rebuilt. Perhaps the most beautiful thing in the church was the lengthy screen, and outside there was a very nearly perfect cross. The tower was extremely fine—one of the finest he had yet seen in Somersetshire. In their way back to Bristol the party called at Long Ashton Church, but the evening was too far advanced for the proportions of this recently-restored structure to be properly examined.

On Thursday week the archæologists had a long local ramble, when they commenced at nine o'clock in the morning at the Mayor's Chapel in College Green. Mr. T. Blashill had been announced in the programme to read a paper on this chapel, the Ancient Hospital of St. Mark, but in his unavoidable absence the paper was read by Mr. E. P. Loftus Brock. The Hospital of St. Mark, at Billeswick, was founded by Robert de Berkeley, who was the second son of Robert Fitzhardinge, the founder of the Abbey of St. Augustine. The original foundation was for the maintenance of a chaplain and the daily relief of 100 poor, and was under the control of the canons of St. Augustine. Robert de Berkeley married Alice, the daughter and heiress of Robert de Gaunt, her mother being Alice, the daughter of Hugh de Montford. The children of this marriage were Maurice and Eva, of whom Maurice took his mother's surname of Gaunt. Maurice de Gaunt probably completed the fabric, and he gave the Hospital its first charter. He was one of the barons actively engaged against King John, but was afterwards a loyal subject of Henry III. His death took place in France, during an expedition against Louis IX. The church is not in the usual position, the chancel standing north-east. It originally consisted of nave, chancel, and transepts, of good early thirteenth-century work, portions of which about the arches of the transepts may still be seen. Modern stalls have been introduced for the mayor and corporation, as well as a modern gallery with face tracery. The west window of the nave is of the early fifteenth century restored, and the glass used is chiefly from Fonthill, partly German, and partly French; some of it is dated 1543. The paper concluded with some interesting particulars of the tombs and monuments within the church. At the conclusion of the paper, Mr. Loftus Brock described some of the principal objects of interest in the church. The beauties of the chapel at the right of the chancel were dwelt upon, and Mr. Brock referred particularly to the early Spanish tiles with which the floor of the chapel was covered. Some of the tiles were mixed with others of English make, of an anterior date, the reason for this being no doubt that they were unable to obtain more of the particular foreign manufacture.

The visitors next crossed College Green, and attended morning service at the Cathedral, after which they assembled to listen to a description of the chief features of the edifice given by Mr. Gordon M. Hills.

Mr. Hills said the Augustine canons of Bristol monastery were not followers of the St. Augustine who came to Christianise this country, but of an ecclesiastic of the same name, who in very early times did much to spread Christianity in Africa. About 1220 the order was finally constituted, and they must distinguish carefully these canons from the friars who were connected with the order, for he had seen in a recent publication that this was called a house of Augustine friars, which was not the case. Again the house had been called a house of canons of St. Victor, and that might be, as he was one of the saints that assisted in the foundation of the order. The foundation of the collegiate church was laid about 1140 by Robert Fitzhardinge, some authorities state about 1142; and it was commonly received that the church was opened for service in 1148; but he thought that date wanted a great deal of reconsideration. By the kind permission of Lord Fitzhardinge, he had visited Berkeley Castle, and found in a book of charters a note which said that canons were introduced in 1148, and he thought the church might have been so far raised then that the consecration could take place; but they had to look much

later, for the initials of four bishops mentioned as assisting in the consecration did not agree with those mentioned as having, in another authority, consecrated the church, and they had to look later for them. It was also said that four canons of Wigmore were introduced to the collegiate church, but then there was this difficulty, that no canons were at Wigmore until 1179; and again they were told that the Sovereign was present at the consecration, and this could not have been in 1148. Mr. Hills passed on to notice the remains of the Norman work in the Cathedral, and he observed that it had been a question whether the church was actually built complete; that is to say whether, as well as a choir, it had a nave. He thought that could not be doubted, as outside the wall behind him, at the west end, were still some Norman remains, and they had the church spoken of as late as 1480, and William of Wyrcestre had measured it. It was difficult to fix the exact date when the nave disappeared. The Cathedral was much mixed up with the history of the Berkeley family, and when prosperity was with the lords of that family then the building progressed; and when they lost their means, as they often did in the commotion that prevailed, then the work of the building stopped still. Between the years 1306 and 1363 they might attribute most of the work now lying eastward of them. By means of plans Mr. Hills illustrated the monastic buildings in the collegiate structure, observing that it was only in later times that the place became a Cathedral. The speaker next entered the choir and stood near the lectern which, at a cost of £150, was obtained as a memorial to the late Precentor Caley. He said that the high altar stood a little in front of where he then was, as appeared from William of Wyrcestre's description. He called the attention of his numerous audience to the east window as one of the most splendid examples of the Decorated period. Winstone, a great authority, on examination of the ancient stained glass which filled the greater portion of the upper part, concluded that the glass might be of the year 1320, and he came to that conclusion from an examination of the coats of arms. But, whenever it was actually built, there was a tendency to the next style, viz., the Perpendicular; and, seeing the works were going on in 1363, evidently they took a long time in execution. The arcade at the east end was not wholly ancient, as the centre one and the two small panels were modern, and, he thought, put in at the suggestion of Mr. Britton. There had been an ugly oak Corinthian screen, and an order still in existence commanded the dean and chapter to cut away the tabernacle work at the east end, and that screen was put up to cover the blank. When 35 years ago that was cut away, the central arch was made as now seen. Near the east end were some remarkable tombs which he desired to call their attention to, though he did not ask them to admire them. They appeared to have been made very much to fill the recesses, and not at the death of the particular abbots, but to fill up the niches and have a complete series of effigies at one time. A gentleman had just pointed out to him the O. G. arches that led to passages in the wall, and that gentleman suggested they were of Spanish origin, but he (the speaker) did not altogether see that, as it was not an uncommon arrangement. The gentleman also reminded him that the inverted arches outside the tabernacle furnished a singular coincidence, taken into account with the arches in the passage doorways. Mr. Hills adverted to the stall-work in the choir, which was, he said, evidently by Abbot Elyott, one of the latest of the abbots, who presided from 1515 to 1526. The vaulting in the aisles was also deserving of notice, as remarkable in construction. The roofs of the aisles were of the same height as the roof of the nave, and this gave an originality and loftiness of design to the building, and the details exhibited a piece of rare mechanical and mathematical skill. The south aisle was next visited by the party with Mr. Hills for their guide. That gentleman said they would notice one fact of peculiar construction in the south aisle, that the eastern window was somewhat dwarfed; but he could not fail to express his admiration at the construction and appearance of the work. The paneled tombs were likewise noticeable, one of them opening into the Berkeley Chapel, which was made for two altars. It appeared that the altars in the Cathedral, besides the altar of St. Mary, which stood at the extreme end were these; the altar of the high cross, two of St. Augustine, and others of St. Apollonia, St. Antony, and St. Erasmus. In the Berkeley Chapel they would observe the very re-



markable work upon the tomb itself, and the roof of the ante-chapel, which was peculiarly constructed. There were also other details worthy of attention. The north aisle was next inspected, and its main features descanted upon.

By invitation of the Mayor and Corporation, the party, after they left the Cathedral, visited the Council House, in order to examine the civic curiosities. The charters of the city were descanted on by Mr. Birch, and one or two are highly interesting. Amongst the pictures, Mr. Nicholls pointed to that by Vandyck of the Earl of Pembroke, a valuable ornament to the Council Chamber. It is life-size, and the family are reported to have offered to cover it with guineas if they might become its possessors. To this the chamberlain is said to have replied, "Put them edgeways, and then we will begin to think about it." There was likewise pointed out specially Kneller's portrait of James II., which was discovered in a singular way. One of the pictures being dirty was sent to be cleaned, when Mr. James Curnock, the artist, discovered another face underneath, and obtaining leave he carefully removed the surface daub, and discovered a valuable portrait of James, which had been covered, doubtless, on account of the extreme unpopularity of that Monarch in Bristol at the time of the Revolution. Other striking portraits in the painted chamber that were adverted to were Vandyck's Charles I.; Charles II. by Hoskins; George I., and George II., and Lawrence's portrait of the Duke of Portland.

In the afternoon the members of the Association and friends were invited by Mr. W. A. F. Powell, Master, and the Society of Merchant Venturers, to a luncheon in the fine hall of the guild.

Leaving the Merchants' Hall, the party visited the church of the Benedictine Priory of St. James's, which Mr. Hills and Mr. Taylor described, Mr. J. R. Bramble giving some particulars relative to an ancient tomb.

The Dominican Friary in Merchant-street was next inspected, Mr. Hills giving some interesting particulars of the building in what is now called the Quakers' Friars. The long schoolroom in which they were assembled he believed to have been the refectory, and the kitchen would have been below it. He dare say the roof was as old as the fourteenth century.

St. Bartholomew's gateway, near the bottom of Christmas Steps, and leading to a feather factory at present, was inspected. The Red Lodge, Park-row, was the last place inspected on this occasion, and here Mr. Hills read Mr. J. Taylor's account of the Carmelite friars, who formerly lived on the spot, and remarked that the Red Lodge dated from 1590. Votes of thanks to Miss Carpenter for her kind invitation to the Society, and to Mr. Hills, who had throughout the day taken without notice the place of Mr. Blashill, were passed before the party left the building.

The evening meeting at the Fine Arts Academy was well attended, and was under the presidency of Mr. K. D. Hodgson, M.P., the President of the Association.

Mr. S. J. Tucker (Rouge Croix) read a paper on "The See of Bristol and its Bishops." Mr. John Taylor read a paper on "The Earliest Appearances of Bristol in History." Mr. T. Kerslake read a paper on "St. Ewen—Pre-historic Bristol," and the meeting separated.

On Friday an excursion was made into Somerset and Wilts. Starting from the Great Western Station, the members proceeded first to Keynsham, where a fine field of research had been opened up to them by the enterprise of Mr. Cox, who, in erecting some houses on land of his own, has disclosed the remains of the Abbey. Mr. G. R. Wright gave some interesting particulars of the Abbey. In a corner of Mr. Cox's garden, he pointed out some capital tiles that were now exposed to view, and he remarked that this portion of the structure was presumed to belong to a side chapel, though some thought it was part of the Abbey itself. The greater portion of what remained of the old structure was uncovered about eight or ten years ago, but the corner where they now stood had only recently been disclosed. There were some slabs with carving and inscriptions of the thirteenth century, two of which had been removed to the Literary Institution at Bath. Portions of the tabernacle work of the fifteenth century, which composed the canopy of a shrine, were very well carved. An account of the abbey had been printed in the Transactions of the Bath Field Club, and Prebendary Scarth had written a paper

on the Abbey for the proceedings of the Society of Antiquaries. Within the last year some Saxon work had been found, and no doubt the Abbey ruins contributed much to the building of the great house of Chandos in Keynsham. The Abbey was founded by William of Gloucester, in 1170, for some black canons, and attached to that place was a legend of considerable interest. A lady of the name of Keyna, a British virgin, lived at Keynsham as a recluse in a wood which was infested by serpents; but her prayers were so diligent that at length the serpents were turned into stone. The Ammonites found in the neighbourhood were supposed to be some of the remains of those interesting serpents; at least, the country people thought so. Mr. Cox conducted the party round his garden and pointed out specimens taken from the Abbey, which he had used for decorating his enclosure. Part of the tombstone of one of the abbots, bearing the date 1499, was well worthy of attention, and the figure of the Saviour riding on an ass furnished an excellent example of the workmanship of the period.

The archaeologists having taken a glance at the church of St. John, next joined a number of their company who had come from Bristol in a special train and proceeded to Bath, where several conveyances were waiting to take them, *via* Wraxall and Chalfield, to Bradford-on-Avon. Mr. Davis acted as cicerone.

At the Manor House, Wraxall, a halt was made, and the old structure inspected carefully. The building is an excellent sample of a stone manor house of the time of Edward IV.

Chalfield was subsequently visited, and the manor house here, with a church adjoining, furnished objects of much interest.

The party next went to Bradford-on-Avon. The Rev. Prebendary Jones showed some of the striking features of the old church. The principal curiosity of the town was the Saxon church, not far from the parish-church, which was described by Mr. Davis, who said: The schoolhouse at the north of Bradford Church, notwithstanding the numerous alterations it has undergone during succeeding ages, retains unmistakable evidence of its having once been a chapel or church; and not only does the arrangement still exist of nave, chancel, and north porch, but it still bears architectural proofs of a very early foundation. The nave, 25ft. 6in. long by 13ft. 4in. wide, was entered by an arch (still existing) from a north porch, which was entered also by a doorway almost immediately opposite. The inner arch is the earliest positively decorated arch I have yet seen. The archway, which is not recessed, is 2ft. 10in. wide, and springs from an impost which is simply a plain stone course, stopping also a slightly moulded pilaster, formed by a series of segmental rondels. Above this the impost is continued over the arch as a hood moulding. In the east side of the nave is a small fragment of an arch, sufficient only remaining of the arch to determine its width at about 4ft. 10in. It is precisely similar in every respect to the other; and, singularly enough, is not more embellished, although there can be little doubt that it was the entrance to the chancel. Above it, in the wall, were the figures of two angels with expanded wings, now removed to the exterior, which probably held a *Vesica Piscis*, containing the sitting figure of our Lord, as in the tympanum of the south door at Ely. There is one window of the porch still used, another to the south of the chancel blocked up. They are played both internally and externally, are circular-headed, and bear every evidence of being the original windows. It is much to be regretted that no other remains of the first windows exist, it being difficult to complete the plan in this respect; but I have no doubt there was another window to the north of the chancel, and probably two on the south side of the nave of the same form. At the west the greater portion of the wall has been removed, so all is conjecture. I venture, however, to suggest that there was a small circular window placed somewhat high in the building. The exterior is the most worthy of notice, as it perhaps exhibits the most perfect remains of the earliest architecture in England, certainly as early as any in Wiltshire that I have yet seen or heard of. The building, as first existing, was of three distinct roofs, marking the position of the several portions; and that over the porch, although not at the original elevated pitch as marked on the side wall of the nave, yet retains the same line of drip, but the others have been entirely altered. All the elevations, excepting the porch, which was of two stages, were divided into three. The lower was quite plain,

with the exception only of a series of very slight projections; indeed, the projections are so slight they can only be called pilasters, and not buttresses. These occur at regular intervals, and support a string-course which runs flush with it all round the building (except where recently destroyed). Upon this string-course runs an arcade, a series of flat pilasters (partially moulded on the east) formed by upright stones not tailing into the wall; upon these are square blocks of stone slightly bevelled, which support, or appear to support, plain arches. They appear to support because the arches are only surface decoration, not being at all constructive arches, as they are cut out of the stone, which runs, irrespective of them, in regular courses. The porch has a similar decoration on the north; but to the east and west the pilasters do not support arches, but merely a tabling which on one side certainly is original, and is built to receive the eaves. In the eastern gable of the nave and chancel are the remains of an arcade above this one, which was built to take the form of the pitch of the roof, being stilted in increasing height to the centre; but from the alterations since made in the roof, by depressing its elevation and inserting flues, the upper portion is entirely destroyed. The pilasters on the east elevation are moulded into three depressed rondels, a very simple form of decoration—in fact, the earliest form met with in this country; this work is therefore more valuable, perhaps, than any other in this building, as it, in the first place, marks the superiority of the east over the other elevations, showing at once that the building is, without doubt, a church; and in the next place, together with the peculiar way in which the lesser pilasters (which support the arcade) are built, mark the antiquity of the structure. Without any existing record of the erection of this building to strengthen my opinion, I should hesitate to assign so early a date as the work here perhaps exhibits, but I have no hesitation in saying that this building has as great a claim to be considered eleventh or even tenth century work as any which assumes that honour (without any documentary evidence); but as I am convinced Saxon, as we call it, never existed as a distinct style, but was rather a Saxon modification of the Norman, it would be difficult to say whether this was built prior to the Conquest or soon after by Saxon workmen uninfluenced by imported refinements.

The Duke's House, Bradford, was visited by some of the party. It is a tall mansion, full of windows, and is supposed to have been built by the architect of Longleat, viz., John of Padua; but there are some signs in the drawing-room and also in the adjoining room that the internal fittings of stone were the work of another and less experienced hand. After Bradford had been explored, the party re-entered their carriages and were conveyed to the Grange, about a mile from the town, and the residence of Mr. Buddle Atkinson, who had invited them to luncheon in a marquee pitched in front of his mansion. The return journey was then accomplished to Bristol in capital time for attending the evening meeting of the Association, which was held in the Fine Arts Academy. Papers were read by Mr. Morgan on "The Landmarks of Early History in Gloucestershire and Somersetshire," by Mr. F. J. Nicholls, on "Some Public Documents belonging to All Saints Church, Bristol;" and by Mr. R. Phillips, LL.D., F.S.A., on "The similarity between the Ancient Usages and Customs of Bristol and London."

In their excursion on Saturday the members of the Association contrived to cover a large tract of Gloucestershire. A special train conveyed them in the morning from Temple Meads to Thornbury. The castle was the first object inspected. The party stayed a little time in the base court, admiring the entrance, and learning that the land around had recently been recovered by the owner. The inscription above the doorway tells of the erection of the residence by the Duke, and Mr. Roberts remarked that though ten years in progress the structure was never finished. That gentleman had brought with him the elder Pugin's "Examples," but not so much to give extracts therefrom for the edification of his hearers, as to question the statements therein contained, and he observed that Pugin had not seen Leland's account of the castle, and wholly misapplied the buildings. Having entered the inner court, the attention of the company was called to the date 1514 on the chimneys, as testifying to the fact that it evidently took the workmen three years to arrive at that point. The original style of the



chimneys is seen in the stack on the north side, but after the commencement of the building a brick system of construction had become popular, and this exemplifies a more elaborate mode of workmanship than is seen in the rough stone of an older date. Pugin has made a mistake in calling the portion of the structure on the south side the great hall, as it seems most probable this hall was opposite the gateway and had been now utterly destroyed. Some idea of its size may be gathered from the fact that in 1510 the Duke's guests and household numbered upwards of 450 persons. The party ascended to the summit of the tower, whence may be seen a magnificent expanse—the Monmouthshire side of the Severn and the Forest of Dean in one direction, the Cotswolds towards the north and north-east, at the south and south-east the well-wooded country about Wickwar, Rangeworthy, and Almondsbury. The apartments of the castle were also explored, and then Mr. Wright produced an enlarged plan copied from the one given by Pugin, which, however, was not complete, and did not give an idea of what the building is. Mr. Roberts said that now Mr. Howard, the owner, had given them permission to see the castle, he hoped to be able to furnish such a plan as would illustrate what the buildings were in their entirety. Scarcely any mention was made of a former house on that spot, but there must have been one of very considerable size before the Duke began to pull down and rebuild.

The short distance between the castle and the church was next accomplished. Mr. Roberts said the structure had been restored about 30 years ago, and this task appeared to have been very carefully done. Before the present edifice there existed a Norman church, but except the wall of the north aisle and the north door he could not point to any part which showed that origin; though the north door was certainly of the late part of the eleventh century or the very beginning of the twelfth. The south door showed a later period, and that had been most carefully restored, and showed the mouldings of the thirteenth century. The church consisted of a rather large and wide nave, aisles, chancel, and two chantries. The stone pulpit had been accurately restored, and stone pulpits seemed to abound in this part of the country. Leaving the interior the party walked round the exterior, and Mr. Roberts observed of the tower that it was very much like the Somersetshire towers they had seen, and the magnificent parapet was about 16ft. high. Of similar parapets there were only three instances known in this part of the country. There were marks that the church was of greater age than the windows, for as the tower went up the windows seemed a little more debased, and as the tower ascended the work became less and less pure towards the summit. A projecting stone near the north door puzzled all the party, and they also exercised their wits to demonstrate how, according to the chronicler, access was gained from the castle to the church; and whether a gallery or chambers were built. An interesting feature was the priests' door into the chancel and the door into the south chantry adjoining. Mr. Roberts remarking that an ordinary architect, by such an arrangement, would think he was weakening an essential part of the building. Still, it appeared in that instance to be strong enough, and he advised the churchwardens to open the stone work and have doors put in. There was a priest's chamber over the porch, the staircase to which was inside, or in an angular piece of masonry under the spout at the east of the porch. It was by no means uncommon for the priest to have a chamber over the porch.

Thornbury possesses other antiquities than the castle and church, and Mr. J. C. Gwynn, Mr. Scarlett, Mr. MacLaine, and Mr. Thurston showed where curiosities existed in private houses. The inhabitants courteously displayed any features of interest in their dwellings, and Mr. Lonnen in particular gratified the excursionists by permitting them to inspect two capital large tables of the sixteenth or early part of the seventeenth century.

After luncheon a string of breaks that had arrived from Bristol drew up outside the Swan Hotel, and the party enjoyed a lengthy ride through Iron Acton, Yate, Chipping Sodbury, and nearly to Badminton. At Iron Acton a halt was made by some for the purpose of inspecting the Manor House, at present farm buildings. The place dates from the sixteenth century, and is intimately associated with the Poyntz family, a record recently discovered stating that here Sir

Walter Raleigh visited Sir Nicholas Poyntz. The church at Iron Acton, that has not much in it worthy of note, was made another resting-place. A long drive well nigh to Badminton brought the party to Little Sodbury, and leaving the vehicles they walked through the fields to the camp, where, it has been ascertained, Margaret, Queen of Henry VI., took up her position before the battle of Tewkesbury, but was driven from the place by Edward IV. The Manor House, interesting as having been for a time the residence of Tyndale, the translator of the New Testament, when tutor to the Walsh family, was scrutinised. The beautiful little oriel window of the fifteenth century in the west front was especially admired. The oldest part of the house is the hall and the withdrawing room; the next oldest the portion extending southwards and the additions of 1770, which evidently were made by using the older materials. The windows seen in the hall are those of the sixteenth century. After the party had left the inside of the house Mr. Roberts made a few remarks on the neighbourhood. He said there were three Sodburys, all deriving their name from the camp, and all within a short distance of the camp. They were Old Sodbury, Little Sodbury, and Chipping Sodbury. It appeared to him that Chipping Sodbury, being the largest, was the original, but he was told that Old Sodbury was the original. Chipping Sodbury was not so named until the grant of the market in the reign of Henry III., and the name was derived from the "chepe."

A walk back to the breaks through the camp was next taken, and then the route was resumed, the vehicles returning to Yate, time not permitting of the churches on the way to be inspected.

The evening meeting was well attended. Mr. W. De Gray Birch, F.R.S.L., made some remarks on unpublished historical documents in Bristol. One document of the time of Henry VII. was a list of the costs and payments relative to the quarry at Dundry, where a great deal of the stone employed in building Redcliff Church was obtained, as it was more durable than that brought from Bath, and it had also been largely used in the restoration of the church. Mr. J. Taylor, of the Bristol Library, read a paper on "Old customs and old Records." Mr. H. W. Henfrey read a paper on the Bristol Mint. He stated that the earliest coin struck at Bristol (so far as he had been able to discover) was a silver penny of Ethelred II. (reigned A.D. 978—1016.) At the great re-coinage in 1696-7, Bristol was one of the five county mints which were set up to expedite the coinage. Half-crowns, shillings, and sixpences of William III. were, therefore, issued of each year (1696 and 1697), and are distinguished by the letter B under the King's head. By a license from Queen Elizabeth, a farthing token was struck by the Mayor and Corporation for the town and neighbourhood. It is considered to be the earliest English token, and the only one sanctioned by the State before the eighteenth century.

The members, to the number of about 100, left Bristol at 9.30 a.m. on Monday for Worle station, and on alighting proceeded direct to Woodspring Priory—the main objects of interest connected with which were ably pointed out by Mr. T. Blashill—the fine mouldings of the tower especially attracting notice. On arriving at St. Kew's Steps, at Kewstoke, the Rev. Prebendary Scarth took the lead as a guide, and gave a description of the surroundings. On attaining the summit and passing through the sundry enclosures which, as explained, were formerly used for protecting cattle in times of siege, the explorers came to the stronghold of the camp, after passing seven distinct ramparts. The thickness of the wall, which was said to have ranged from 10 to 100 feet, having been pointed out—some of which still remain, whilst other portions have fallen over and become mere ruins—the platforms used by the slingers for the protection of the camp next attracted the observation of the explorers; and, in verification of the assumption for which such platforms were used, there still remains a quantity of round stones that had evidently been provided as the ammunition of the then defenders of this part of the coast. The pit dwellings of the ancient inhabitants of Worlebury Hill were next inspected—one in which three skeletons had been found being more particularly pointed out. The party subsequently adjourned to the Town Hall, Weston-super-Mare, where luncheon awaited them. In the course of the post-prandial proceedings, the Rev. Prebendary Scarth expressed a hope that in the progress of building in Weston-

super-Mare the ancient remains in the immediate neighbourhood should not share a similar fate to those on the other side of the Avon—old ramparts and objects of interest to the antiquary being there levelled to the ground. The party afterwards proceeded in breaks to Axbridge and Cheddar, the many objects of interest on their journey affording much curious and useful information. Upon the return of the archaeologists to Bristol they were entertained at dinner by the Mayor, whose hospitalities brought the 31st annual congress of the Association to a pleasant termination.

On Tuesday another excursion was made by some of the members to Tintern Abbey, Chepstow, and the neighbourhood. Chepstow is world-renowned as the great citadel on the Wye. Its deeply-recessed doorway and carved arcade beneath the tower were much admired, but there was too much of the restorer's hand visible in the rest of the church to please the archaeological eye. On passing through the portals the port-cullis groove and the openings for pouring missiles on the head of the besiegers first strike the eye. The long slits were for the longbowmen, and the cross œillets were for the cross-bowyers. The early date of the great entrance towers was shown by the absence of stone machicolations on the summits of the towers. The castle itself stands on a bold escarpment of limestone rock, above the Wye, and possesses four baileys, or wards, all defended with consummate skill, and wrought with the greatest strength. The fine proportions of the central hall, and the beauty of its Early English mouldings, the elegance of the windows, as well as the general plan of the castle, were duly commented on. There are but few castles which illustrate to a greater extent the science of Mediaeval fortification. Then along the Wye, and climbing the lovely wind-cliff to Tintern, gave the excursionists an opportunity of again observing the fine eye for natural beauty which characterised the Cistercian monks. Occasion was taken to discuss Mr. Edmund Sharpe's theory with respect to the *Domus conversorum* of Fountains, a point earnestly discussed at the Ripon congress. Opinions were divided on the subject, and it will probably be the theme of discussion at some of the ordinary meetings of the Association. The great patrons of Tintern were the owners of Chepstow, or Strigul, as it was called. The monks were good farmers, yet there are indications that so beautiful an abbey was by no means rich. It fell at the Dissolution into the hands of the ancestors of the Beauforts, and in their care it still remains.

#### NEW BOARD SCHOOLS AT BRADFORD.

FOUR new Board schools were opened in Bradford on Monday last. The Ryan-street Schools have been built from the designs of Messrs. Jackson and Longley, architects. Mr. Squire Holdsworth, builder, of Wike, took the whole contract and sub-let it to other people. Mr. Alfred Thornton was clerk of the works.

The Barkerend Schools have been erected from the designs of Messrs. Andrews and Pepper, architects. The style is French Gothic, simply treated, but a tower in the original design was cut out to decrease the cost. The shape is the same as most of the other schools, the infants' school in the centre projecting to the rear, and the boys' and girls' schools in the wings. Mr. S. Holdsworth was the contractor.

The Dudley-hill Schools are situated on the hill-top, near the extremity of the borough, at Bowling. They are neat in design, and have been built from the designs of Messrs. Knowles and Wilcock, the architects. The T-shaped style has been chosen, the boys at one end, the girls at the other, and the infants at the rear. The façade is broken by four gables, filled with tracery windows, one gable at either end and two in the centre, a well-proportioned bell-tower rising to a height of 90ft. over the boys' entrance, topped with a vane. Mr. Levi Moulson was clerk of the works. Messrs. Milner and Rudd were the masons, and Mr. S. Jackson joiner.

The Horton Bank-top School, built from the plans of Mr. E. Simpson, architect, is exclusively for infants, and is the smallest of the Board-schools. Messrs. B. Illingworth and Son were the builders.

All these schools are built of stone externally, and internally the woodwork is of selected pitch pine, the door jambs, window dressings, and other work of cleansed ashlar. The windows facing



the south are filled in with ground glass to mitigate the force of the sun's rays. The conveniences are Macfarlane's patent. The fittings are of pitch pine, and the playgrounds, large and roomy, are covered with asphalt. The total cost of the eight schools will be £116,429, and estimating the aggregate capacity at 4,480 scholars, the aggregate cost per head per scholar is about £25. 19s. 9d. The following table gives a few particulars respecting the eight Board-schools, which may be found of interest:—

Name of School	No. of Scholars.	Site. Yards.	Cost of Land.	Cost of Building.
Barkerend .....	500	8,353	£3,460	£10,966
Bowling Back-lane .....	500	7,800	2,250	10,794
Dudley-hill .....	480	8,000	2,300	9,520
Faversham-street .....	800	7,851	8,750	14,550
Horton Bank .....	200	7,496	700	5,158
Lilly Croft .....	600	10,365	3,350	11,340
Ryan-street .....	800	9,680	2,800	14,729
Whetley-lane .....	600	11,000	3,600	8,200
<b>Totals .....</b>	<b>4,480</b>	<b>70,545</b>	<b>£33,510</b>	<b>£85,437</b>

	Architects' Com.	Total Cost.	Per head per scholar.
Barkerend .....	£550	£14,976	£29 19 0
Bowling Back-lane .....	435	13,659	27 6 4
Dudley-hill .....	480	12,300	25 12 6
Faversham-street .....	532	23,832	29 15 9
Horton Bank .....	350	6,208	31 0 9
Lilly Croft .....	460	15,150	25 5 0
Ryan-street .....	500	18,029	22 10 8
Whetley-lane .....	475	12,275	20 9 2
<b>Totals .....</b>	<b>£3,782</b>	<b>£116,429</b>	

#### SUTHERLAND'S MODE OF PAINTING ON GLASS.

THE principle of this invention is entirely new, and by its use effects can be obtained of extreme value in decorative art, by means never hitherto used in painting upon the surface of glass. All painting upon glass so far has been limited to the production of stained or painted windows, &c., the only exception being glass signs. All attempts to paint upon glass for mural decoration have proved a failure, not for want of talent, but because the smooth glass affords no key for the paint to adhere to, and, as a consequence, the difficulty of graduating the tints or blending one into the other, have been insuperable; and even when the attempt has been anything like successful, the colours have had a garish and unfinished look, heralding failure unmistakably. This invention puts aside all these difficulties, and enables the artist to produce a painting upon the glass in character only limited by the skill of said artist, and paintings of any size may be produced and put together in sections on large wall spaces, forming, when complete, historical paintings which can only be destroyed by actual violence. No damp or foul air can affect them, and they will only require to be wiped at any time to keep them clean and bright. The patented process is simple in its nature, and may be practised by any one having an artistic knowledge of painting. The *modus operandi* in brief may be described as follows:—The patentee uses ground or obscured glass to paint upon; one side of the glass is ground or roughened with emery powder in the usual manner. The rough surface gives a key to bind the painting, and also enables the artist to produce any colour, tint, or tone of colour, with power to blend, and graduate the same also to glaze upon the tints of colour, so as to bring out the richest effect of which each colour is capable. Another advantage of the ground surface is that it destroys the crude and garish appearance of the paint as it appears when done upon the smooth glass; in fact, the artist may paint as he would upon canvas, using his colours thin. The design or picture is first sketched in outline upon paper, and then traced on to the glass; it is then either outlined or painted direct upon the ground side of the glass. All those portions of the design which are to appear as gold in the finished painting are washed over with a transparent or semi-transparent yellow in distemper or water colour; and, when dry, varnished with a clear transparent varnish; those parts which are to appear as silver are simply varnished with clear varnish. If a rich blue is required, the colour is laid on in distemper, and varnished, and so on, with red amber, &c., &c. If a tint of colour is required, the parts are painted over with oil colours, and then wiped off again, leaving as much or as little as requisite to get the tone or tint required. However clear the glass may be wiped with a dry cloth, the glass will retain a certain portion of

colour, and the shadows may be put in and blended while the colour is wet, the varnished parts being shaded when the varnish is dry. By this method the artist will be enabled to blend in the most delicate tints with a softness of effect and variety of tone not hitherto attainable in painting on glass. The painting being now complete, is subject to about 190° Fahr., which hardens the paint and varnish. The whole of the painting is now covered with leaf silver, which produces on the yellow parts gold, and silver on those parts which are simply varnished on the glass; and any portions of the glass left uncovered, will appear as frosted or dead silver. Its effect upon the painted portions is to cause them to have a luminous appearance, keeping them equal with the gold and silver when viewed from any position, an effect the want of which is condemned by Ruskin and others in those famous ecclesiastical wall paintings by some of the old masters, in which gold grounds have been used; these in certain lights showing the gold and not the painting, the latter appear as a dead mass of paint. The silvering being complete, the work is then varnished, and backed with a suitable paint, which is again stoved. The painted glass is then secured to a thick slab of glass or other substance, by a suitable cement, and is then ready for use, the edges of both being ground so as to fit perfectly square. By a peculiar process, the surface of the glass may have a bright polish, a semi-gloss, or a perfectly dead surface. The patentee is Mr. Wm. Sutherland, 357, Stretford-road, Manchester.

#### ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETIES.

**CAMBRIAN ARCHÆOLOGICAL ASSOCIATION.**—This association holds its annual Congress this year at Wrexham, under the presidency of Sir Watkyn William Wynn, M.P. Among the places which will be visited are Offa's Dyke, Pen-y-garden Earthworks, Watt's Dyke, Hawarden Castle, Bangor Monastery, &c. One day will be devoted to an excursion to Chester, when the cathedral, the ancient houses, Roman walls, &c., will be inspected. The Congress opens on Monday evening, the 24th inst., with the delivery of the President's address, and concludes on Friday, the 28th. There will be, besides the daily excursions, three evening meetings for the reading of papers. A temporary local museum of antiquities, ornaments, manuscripts, &c., will be formed, and be open daily during the sitting of the Congress.

**LONDON AND MIDDLESEX ARCHÆOLOGICAL SOCIETY.**—On Tuesday the members of the London and Middlesex Archæological Society held a general meeting at Fulham Palace. The chair was taken at one o'clock, in the Great Hall of the Palace, by the Bishop, who offered the members a hearty welcome, and made a brief speech, in the course of which he dwelt on the great utility of archæological and antiquarian studies in general, and on the great services which such meetings had rendered within his own knowledge, in the dioceses of Lincoln and of London, to the cause of Church restoration. The Rev. F. G. Blomfield next gave a brief summary of the history of Fulham, showing that it existed as a manor as early as A.D. 691, and attributing the moat which surrounded the Palace to the Danes. After tracing the descent of the manor through successive generations of the Episcopate, he stated that, although it was certain that a palace existed here in the Norman and Plantagenet eras, no portion of the present building was older than Bishop Fitzjames, who rebuilt the entire fabric in the reign of Henry VII., erecting on the old site the present Great Hall, which was used by both Bishop Ridley and Bishop Bonner in the times of the Reformation, and after undergoing certain changes under Bishop Sherlock, temp. George II., and Bishop Howley, temp. George IV., by whom it was converted into a chapel, was at last restored to its proper use by Bishop Tait, in 1866. Then, passing to other portions of the Palace, he related how the library was added by Bishop Sheldon, how Bishop Robinson pulled down his predecessor's buildings, only to be restored and revived by Bishop Sherlock; how Bishop Grindal, in the sixteenth, and Bishop Compton, in the seventeenth century, had improved the Palace gardens, filling them with rare trees and rarer exotics, and anticipating the glories of Kew; how Bishop Terrick had added a wing; how Bishop Porteus had formed the series of Episcopical portraits; and how Bishop Howley had eliminated

almost all ecclesiastical character from the edifice, superseding its semi-Gothic outlines by Palladian details. The Rev. E. H. Fisher, vicar of Fulham, next gave a brief outline of the history of the parish church of Fulham (where five or six of the Bishops of London lie buried), dwelling on the beauty of its peal of ten bells and its elaborate service of Communion plate. Mr. Fisher was followed by the Rev. L. Dale, vicar of Chiswick, who read a paper upon the antiquities of his parish and its historical associations.

#### COMPETITIONS.

**EVESHAM.**—At the meeting of the Burial Board, last week, after discussing the merits of the competitive plans sent in for the laying-out of the new cemetery, the question was put as to whether Mr. George Hunt, of Evesham, or Messrs. Lunn and Sansome, of Kidderminster and Birmingham, should be appointed architects of the Board. Messrs. Lunn and Sansome were elected by a majority of one vote, and will therefore be employed to design the chapel and lay out the new cemetery.

**THE MARGATE DRAINAGE COMPETITION.**—The Council of the Borough at their meeting on Tuesday week, declined, without some further explanation, to accept the award of the referee, Sir Joseph Bazalgette. They complain that the 6th "condition" of the competition issued to the competing engineers appears to have been wholly lost sight of by him. Mr. Sear, the Architect and Civil Engineer to the Town Council, whose generous anxiety to furnish at his own expense a plan for the disposal of the sewage was duly recorded on p. 445 of our last volume, seems still the oracle of the Council, and he declares that the competition has been "very honourably conducted." Meanwhile Margate is fast becoming one of the most unhealthy of our watering places.

**WALLASEY FREE GRAMMAR SCHOOL.**—The governors of this endowment for middle-class education, of which the scheme has lately received the sanction of Parliament, having decided to erect new schools to accommodate 200 boys, divided into seniors and juniors, invited plans from some of the leading architects of the town. Seven responded to the invitation, and the plans have been on exhibition at the boardroom of the Wallasey Local Board. The Governors have selected those prepared by Mr. T. Mellard Reade, C.E., Architect, of Canning Chambers, 4, South John-street, Liverpool, and have appointed him to carry out the work. Mr. Reade's plans are so arranged that they can be eventually extended to accommodate a total of 400 boys.

#### PARLIAMENTARY NOTES.

**ECCLESIASTICAL RUINS IN IRELAND.**—Lord Carlingford, on Thursday, asked the Lord President of the Council whether it was intended to appoint a competent person in connection with the Board of Works in Ireland to take charge of the ecclesiastical buildings which had been or might be handed over to that Board by the Irish Church Commissioners as national monuments. Earl Beauchamp said that the buildings were in ruins. The 25th Section of the Irish Church Act applied to them, and it seemed to him that they were not to be restored or repaired, but preserved, and he considered that the duty of preserving these ruins required a large amount of architectural skill. He thought that it was best that these buildings should not be restored, but simply preserved in their integrity, and the duty of preserving them could be best discharged by a surveyor, but if anything should arise rendering it necessary to call in the assistance of any person the Board of Works would seek the best advice that could be obtained. Lord Carlingford said he wished to avoid the appointment of an architect, but rather an archæologist, who would give sound advice in this matter.

**THE PICTURES IN THE PALACE OF WESTMINSTER.**—Mr. Errington, on Friday, asked the Chief Commissioner of Works whether it was true, as stated in the *Morning Post* of the 5th inst., that Mr. Richmond, R.A., had examined the two water-glass pictures by the late Mr. Macleise in the Royal Gallery of the Palace of Westminster, and had ascertained that they are not permanently injured; and whether it was true that the "efflorescence" which exhibited itself some time ago had been removed. Lord H. Lennox: In answer to the question of the hon.



member for Longford County, I have to say that the efflorescence in question on the magnificent picture of Maclise of the meeting of Wellington and Blucher commenced to show itself shortly after the picture was completed in 1861, and from that time it has unhappily spread all over the picture. More than a year ago Mr. Richmond examined the picture, and he stated that in his opinion by a delicate treatment he could remove the efflorescence without injury to the rest of the picture. That opinion, however, was contradicted by other artists as eminent as Mr. Richmond, and the matter was allowed to drop. With regard to the second question, I would only ask the hon. member to call himself this afternoon at the Royal Gallery, and he will see for himself most painfully that that efflorescence has not been removed.

## Building Intelligence.

### CHURCHES AND CHAPELS.

**BRADFORD.**—A new (Roman) Catholic Church dedicated to our Lady, is about to be erected at Bradford from designs by Mr. E. Simpson. The building will consist of wide and lofty nave, narrow aisles, row of chapels and confessionals on the east side, lady chapel at the south-east corner, sacristies in the front to east parade, with entrance in the adjoining porch, chancel, and tower at the north-west corner. The style is Early Decorated Gothic. The nave is 120ft. 6in. long by 40ft. wide, with a height of 46ft. 6in. to the wall plate, and 74ft. to the ridge, and the aisles are 8ft. wide. The chancel is 25ft. long by 30ft. wide, 57ft. in height to the wall plate and 74ft. to the ridge; it will have an apse end, with windows 19ft. in height and 4ft. wide. The exterior is proposed to be built of random-coursed inside stone, and the interior, with the exception of the pillars of the nave, will be of brick, plastered.

**BROMSGROVE.**—The new church of All Saints, Bromsgrove, Staffordshire, was consecrated on Thursday week. Mr. John Cotton, of Birmingham, is the architect, and the style adopted is Geometrical Decorated, or Transitional. The church comprises nave and side aisles, tower at south-west corner, porch on north side, well-proportioned chancel with apsidal termination and organ-chamber, and vestries for clergy and choristers. There is accommodation for upwards of 600 people. The church is built of the local sandstone, the walls being lined inside with buff-coloured bricks, relieved with stone strings and bandings, the dressings, arches, window tracings, &c., being executed partly in Bath, and partly in local grey sandstone. Messrs. Estcourt, of Gloucester, were the contractors.

**HAMPSTEAD.**—The trustees of Hampstead Parish Church have received a petition from gentlemen resident in or acquainted with the suburb of Hampstead, who state that they have learned with regret that it is proposed to destroy the tower and the east end of the parish-church. "The church in question," they add, "is the only public building of any antiquity which Hampstead possesses, and we should seriously deplore the removal of so well-known a monument of the past. Apart from the question of the intrinsic merits of rival styles of architecture, this building derives a special value from its intimate association with the peculiar charm of the locality, and from its position as the central feature of a street of old buildings of great and characteristic interest. Such a group of English architecture of its period is almost unique in or about London, and the proposal to destroy or to transform its principal ornament will be condemned by every man of taste. Whatever may be the practical conditions which have suggested this scheme, there are obviously many plans by which the requirements of the parish may be met which do not involve an outrage upon the familiar sentiment and aspect of a well-known locality." This memorial is signed by a large number of gentlemen, including William Butterfield, Thomas Faed, R.A., Holman Hunt, J. H. Herbert, R.A., John P. Seddon, George Gilbert Scott, jun., F.S.A., Alfred Waterhouse, and many others.

### BUILDINGS.

**PLYMOUTH.**—The new Guildhall at Plymouth was opened yesterday. The *Western Daily Mercury*, in a lengthy description of the building, which appeared on the 10th inst., declares that

careful examination of those parts of the work which, though they make no show, are most essential to its stability, reveals much that is very far from satisfactory, both in construction and workmanship. The great curved roof, which looks so substantial below, is declared to be a flimsy structure, the rafters which support the slating being only 3in. by 2in. Serious doubts are expressed as to the safety of this part of the fabric, and no doubt whatever is entertained that it cannot maintain its shape for any extended period.

**THE NEW NATIONAL GALLERY.**—The new buildings in the rear of the National Gallery are making rapid progress, and are expected to be completed early next year. They are of the plainest possible appearance externally, but Mr. E. M. Barry, R.A., their architect, has so arranged them that they may ultimately form a part of the grand architectural edifice which has so long been promised to the public. The new galleries will be handsome and spacious internally, their capacity being about the same as those of the Royal Academy at Burlington House. The iron-girded excrecence now seen from Trafalgar-square, covers the central octagonal hall, from which branch off, on four sides, small rooms, 40ft. long and 25ft. wide. There are two large galleries 100ft. long and 40ft. wide, and a gallery about 40ft. square. The system of lighting adopted for the galleries is by a central ceiling of glass, resting upon ornamental covings. The flooring is to be of wood, and the walls are also to be lined with wood, notwithstanding the protests that have been made in and out of Parliament against the use for such purposes of so inflammable a material. Our national art treasures would have been rendered much safer from destruction by fire by the use of tiled floors and plastered walls, as at the South Kensington Galleries. The new buildings will be approached in two places from the present galleries. The ground story will be appropriated for the accommodation of students, and as waiting-rooms, workshops, police-rooms, and storerooms. Messrs. Trollope and Co. are the contractors for the erection of the new buildings, the carrying out of which has only rendered the erection of a new facade the more imperative, the meanness of the present facade being intensified by the large iron and glass structure which surmounts it.

### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK STREET, COVENT-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

### ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 9d. per line.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

### TERMS OF SUBSCRIPTIONS.

(Payable in advance.)

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N.B.—American and Belgian subscribers are requested to remit their subscriptions by International P. O. O., and to advise the publisher of the date and amount of their remittance. If the last-mentioned precaution is omitted, some difficulty is very likely to arise in obtaining the amount. Back numbers can only be sent at the rate of 7d. each, the postage charged being 3d. per copy. All foreign subscriptions unaccompanied by an additional remittance to cover the extra cost of forwarding back numbers are commenced from the next number published after the receipt of the subscription.

Cases for binding the half-yearly volumes, 2s. each.

Subscribers receiving their copies direct from the office are requested to observe that the last number of the term for which their Subscription is paid, will be forwarded to them in a coloured wrapper, as an intimation that a fresh remittance is necessary, if it be desired to continue the Subscription.

**RECEIVED.**—J. K.—C. and H.—E. S.—H. S. and Sons.—J. H. B.—Messrs. M.—A. N. B.—J. B. and Co.—J. R. L.—F. A. W.—J. N.—D. B.—T. S.—C. J. P.—J. M. A.—E. W. G.—T. B. and Co.—Alex. McL. and Co.—P. & A. T. BEDFORD (Our photolithographs are not published separately from the paper)—J. H. SMETHURST (If architects will compete under such conditions, they may, of course. But very few will do so, you may feel sure).—W. H. J. (Cannot promise).

## Correspondence.

### THE RAILINGS ON THE VICTORIA EMBANKMENT.

(To the Editor of the BUILDING NEWS.)

SIR,—A paragraph in your issue of August 7th, headed "The Victoria Embankment," speaks of the destructive effect of steam and gases from the Metropolitan Railway on the railings surrounding a ventilating-shaft near Waterloo-bridge, and predicts their entire decay, owing to their light and flimsy appearance.


Will you allow me to point out that the railings round the ventilating shaft are not the property of the ratepayers, but of the Railway Company.

The railings of the Embankment erected by the Metropolitan Board of Works, and painted with this Company's patent paint, although quite close to the shaft and equally exposed to the injurious effect of the steam and gas, are absolutely free from oxidation; while the Railway Company's railings painted with the ordinary paint are rapidly deteriorating under the same influences. —I am Sir, &c.,

ROBT. ORKNEY, Secretary.

Indestructible Paint Co., 27, Cannon-street,

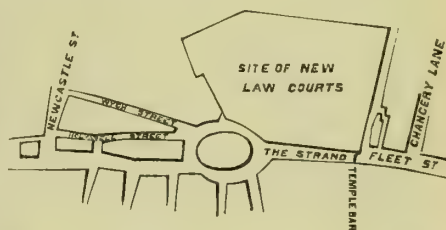
August 10th, 1874.

[We have taken the pains to verify the statements in the foregoing letter, and have found them correct. The top of the ventilating shaft is in shape that of a half-circle or , the straight part of which is bounded by the Board of Works' railings, and the other by those belonging to the railway. The Board of Works' railings are perfectly free from oxidation, though quite as much exposed to the steam and gases as the others, which are rapidly rusting to pieces. The contrast, it is but fair to say, affords the most perfect and satisfactory test of the merits of the Indestructible Paint we have yet seen. We only wish the railings it so well protects were better worth preserving.—ED.]

### TEMPLE BAR AND FLEET-STREET.

SIR,—A good opportunity is offered for another great improvement to be effected in conjunction with the forced removal of Temple Bar, and I trust you will allow me space to suggest it.

A glance at the plan—"as at present"—will

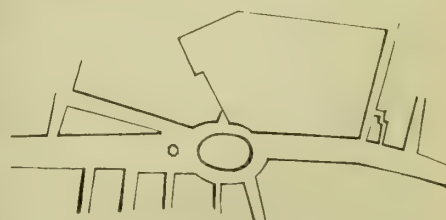


show what a narrow, inconvenient, and cramped passage at present exists at the junction of Fleet-street with the Strand; and when the Law Courts are built, and the vehicular traffic thereby considerably increased, the inconvenience will be doubly felt.

I traverse the Strand myself daily, and can well testify to the amount of absolute pushing necessary at present to pass along this most awkward and narrow thoroughfare.

Holywell-street has long been noted for its obscene and disgusting prints and placards displayed on either side; such as prevents anyone passing through with ladies, or stopping when alone. It is a street, in fact, almost wholly given up to everything revolting and sensual.

A glance at the plan, "as proposed," will show



what a grand open thoroughfare could be formed by the removal of those houses facing Holywell-street and the Strand (only a second Middle



Row). Taking a strip from the site of the new Law Courts, pulling down the few old houses between Bell-alley and Chancery-lane, and making the whole route from Newcastle-street to Chancery-lane one grand open thoroughfare; which people would—instead of dreading to traverse—only be attracted by the splendid entrance from the City of London to that of Westminster.

Greater and more costly improvements have been effected than this proposed, although I feel sure not more required; for who could regret the loss of Holywell-street or the cheapening of the Law Courts a little, while the increased width of thoroughfare, so much needed, would be a largely and ever-increasing boon to all Londoners.

Apologising for occupying so much of your space.—I am, Sir, &c.,

C. H. WALKER, Architect.

3, St. Mark's Gardens, Notting-hill, W.,  
11 August, 1874.

#### TEMPLE BAR.

SIR,—The remark made in your last impression, to the effect that this structure is doomed, and questioning the propriety of re-erecting it, is worthy, I think, of consideration. The site you suggest also appears to be a desirable one; it would there not interfere with the traffic, it would be entirely out of the way, and would also be judiciously placed for that quiet inspection, as a relic of the past, which it may then receive from votaries of porticulated shrines or the "Queen Anne" style. I would also throw out a suggestion, if such re-erection were contemplated, viz., that a considerable part of the old Bar may be removed *en masse*. Indeed, if its removal from the present site was not contemplated, the same plan could be devised for the substantial repair to the foundations. It is this;—After well blocking up, by templates or centrings, the centre side arches, the four piers or supports could be securely tied together by iron bands or straps passing round them, or the entire gate at the springing. These straps, or rods, being well bolted up, it would be perfectly safe to needle the piers transversely just below this strapping and remove them, either substituting new stone piers upon good foundations or placing the superstructure on cast-iron supports encased in stone. By adopting such a plan, the most actively destructive agency, the arch-thrust, would be prevented, and the whole body of superstructure might be preserved intact or transposed. I throw out the hint.

Some of the daily papers are for demolition at any price. Now, if we can preserve as well as remove the obstruction let us. The idea that the gate has a tendency to fall towards the Strand is too ridiculous; or that the centre of gravity is in perpetual danger of falling outside the area of base; or that the latter is not sufficient. Such ideas are not worth listening to. It is true the horizontal lines have considerably deflected, and that the voussoirs of the flatter segment of the centre elliptical arch have sunken perceptibly. The key-stones I find, also, from a careful examination, have slipped downwards; but all these defects could be corrected by wedging up after the base or springing of arches was secured.

It is true the associations of the old gate are not of the happiest or most pleasant kind; that its renown wears a tarnished lustre; that its summit exhibited the heads of "traitors"; but still it has a history, perhaps, worth recording—at least, it is one of the few links which connect the London of the past to that vast agglomeration—the London of the present, and as such, it may be worth preserving.—I am, Sir, &c.,

P.S.—The only immediate danger is (or was, before the present propping was provided) the slipping of the flatter segment of the centre arch, or the dropping of the keystone, and this would probably bring down a considerable portion of the superimposed work lying directly on it; but it would not follow the whole superstructure would come down.

TO E. W. GODWIN, F.S.A.

SIR,—I should like Mr. Godwin to refer to a letter of his in your issue for February 21st, 1873. Why is it "an impossible feat that the designer of Inverness Cathedral is identical with the designer of Edinburgh Cathedral"? Mr. Godwin's argument, applied to himself and Mr. Burges, would show that if they designed Northampton Townhall and Cork Cathedral, they could not possibly have designed Castle Ashby Entrance Gates, and Worcester College Chapel and St. Paul's decorations. If it is impossible for Mr. Ross to design in two different styles of Gothic (where the principles are the same), how much more impossible must it be for Messrs. Godwin and Burges to practise in two styles, differing so utterly in detail, principle, and construction as Gothic and Renaissance. Will Mr. G. enlighten yours, &c.?

JOHN T. BARTLETT.

The death is just announced of the portrait painter, Thomas Carrick. His portraits of Lord Russell, O'Connell, Lablache, and Farren the actor, were exhibited in all popular print shops. Mr. Carrick was a self-taught man, and was a native of Carlisle.

## Intercommunication.

### QUESTIONS.

[3415].—Ancient Fret Hand-Saw.—I have in possession and daily use by one of my assistants, a saw which I am inclined to think may be as old as any now in use, and hence should feel interested in knowing if there is an older one. It is made much the same as modern ones, and, without the handle, measures 6½ in. by 6½ in. The shape is thus three sides of a square, the hair-saw forming the fourth. It is made wholly of ½ in. by ¼ in. steel, and is slightly ornamented by a line quirked down as a border upon each side. Upon the top face

is the date 0 0 1,592 0 0 and on one side of the up-

right are the initials 0 0 W B, 0 0 and on the other

0 0 R V 0 0 There can be little doubt of the

date being genuine; and when it will be remembered that it was only four years before that Sir Francis Drake, Hawkins, and other West-country heroes thrashed the Spanish Armada, and that during that very year Sir Francis was member of Parliament for Plymouth, the associations brought to one's mind by this handy little tool are not a little interesting.—HARRY HEMS, Exeter.

[3416].—Breaking Weight of Timber.—Having read with great interest your report of Mr. Lynde's remarks at Manchester upon the qualities and use of timber, I should like to ask either him or any of your readers, if the formula which he gives is to be read— $B + D^2 \times 15$

equal breaking weight of beam; as, for example, take a joist 9 in. deep, 4 ft. wide, and 12 ft. between supports; then

$$\frac{4 + 92 \times 15}{12} \text{ equal } 11.16 \text{ tons}$$

as the breaking weight, when according to other authorities, by using the constant for the kind of material and the following formula (the constant for fir timber is about 400)

$$\frac{B \times D^2 \times C}{L} = \text{breaking weight.}$$

take the same example

$$\frac{4 \times 92 \times 400}{12} = 4 \text{ tons } 1841$$

I should feel obliged if any one will say which is right.—R. MANCHESTER.

[3417].—Circular and Skew Arches.—Would any of your readers inform me who is the author of the best works on circle and skew arches, and taking out quantities; and where procurable?—A READER.

[We cannot quite understand this query, whether he means "best works on the Circle and Skew Arches," or circular and skew arches, for there are works on both subjects. Taking the latter as his meaning, we think he cannot do better than study Buck's work on Oblique Arches, or Hart's work on the same subject. As to circular arches, the most authoritative and exhaustive are by Professor Rankine in his "Applied Mechanics," and Canon Moseley in his "Mechanical Principles of Architecture," and also Fenwick's "Mechanics of Construction." Other more elementary treatises are those published in Lockwood's (Weale's) Series; and Mr. Tarn has written a useful work which treats on the subject, "Science of Building." Dobson's "Student's Guide to Measuring" is one of the best works on "Quantities." Lockwood and Co. are the publishers, I believe. Mr. Banister Fletcher's work on Taking Out Quantities is also a very useful guide, and appeared in these pages not very long since.]

[3418].—Cube of Buildings.—In saying a building costs 6d. per foot cube, will some kind reader inform me where the measurements are taken?—T. S. L.

[We should take the dimensions as follows: For vertical height, from the bottom of footings to the centre of roof; for the other two measurements the length and width should be taken to outer faces of walls. In an irregularly-planned building, where different masses interfere with the taking of two dimensions, the plan is to take the larger portions first and then the smaller masses separately, adding the results together and multiplying by the common heights. In cubing anything, the superficial area must be multiplied into the height; and the point in cubing a building correctly is to find out the average cubical space included within the walls and roof. Some architects take for the height only up to the eaves level; but this is manifestly insufficient, as a great deal of labour is expended in the roof and chimney stacks, and therefore their cubical contents should be included in the calculation.]

[3419].—Staircase.—Can Mr. Robson or any of your readers kindly inform me of any building having similar arrangement of staircase to that shown on page 102 BUILDING NEWS, and erected previous to January, 1872?—BE SURE.

[3420].—Gothic Tracery for Glazing.—Can any correspondent tell me how Gothic stone tracery is usually prepared for glazing. I have generally seen a groove cut in the centre, but this the glaziers object to, and

say it is impossible to glaze small openings with a groove. I have been told that a rebate is the proper thing. This, if correct, would interfere with the width of tracery, which should correspond with the mullions, or the rebate should be carried down through the mullions. Which is correct?—ALPHA.

[3421].—Strength of Railway Bridges.—What is the usual live load per square yard to add to weight of girders, &c., for a railway bridge, and live load per lineal yard of permanent way (single or double road), or live load reduced to dead load for facilitating calculations. Also usual live load reduced to dead load per square yard for a turnpike road bridge.—J. S.

[3422].—Truss Girders.—Allow me to ask the correspondent who wrote about truss girders a week or two back to give an explanatory diagram of a lattice girder with vertical bars between each bay of same, showing the character of the strains on each member in the able manner in which he handled the truss girder, also when the weight comes on the same in two or three different places.—J. S.

[3423].—The Whitworth Scholarships.—I should be glad if you would kindly furnish me with particulars respecting the Whitworth Scholarship competition, whether any restrictions are made as to age, &c., and what subjects are required to be read up in.—W. D. W.

[3424].—Joints of Gothic Vaulting.—Can anyone oblige by explaining upon what principle the joints of the filling-in of ribbed vaulting are set out? Is there a rule for finding how they run from rib to rib which is applicable to all examples, or is their direction a matter of design in each case? I do not see this point touched upon in the valuable papers on vaulting which have appeared in the BUILDING NEWS.—F.

[3425].—The Best Drain Trap.—What is the best stretch trap to use to trap a house drain at a point just before entering public sewer?—J. S.

### REPLIES.

[3406].—Architects' Powers.—"Justice" does not state his case with sufficient fulness to enable one to give a reliable opinion. Did he at the time of the signing of the contract know of the existence of the guarantee which he asserts was given by the architect to the vicar? See a case very much to the point, *Kimberley v. Dick*, BUILDING NEWS, Vol. XXI, Dec. 1st, 1871, p. 419. The full legal report should be consulted in the "Law Reports," or the reports of the *Law Times* or *Law Journal* in the volumes for the year 1872.—L.

[3410].—Taking-out Quantities.—I am afraid "Nemo" cannot claim the percentage for quantities, as no contract was signed. It is one of those cases to be "let alone," although the morality involved is very open to censure. "Nemo" does not distinctly say whether this builder's tender was accepted.

[3411].—Queen Anne's Style.—We hear nothing of the desirability of a revival of the style of the period of Queen Anne for ecclesiastical buildings. "G. R." wishes for the enumeration of some Queen Anne buildings. One he will find interesting and characteristic—a fine church by Hawksmoor, the architect, St. Anne, Limehouse. The designs are at the British Museum.—L.

[3412].—Selenitic Mortar and Concrete.—In reply to "Aristo," the difference in strength between Selenitic and Portland is most apparent when mixed with sand. Experiment has shown that when Selenitic cement is mixed thoroughly with six parts of clean sand, it is very much stronger than Portland with the same quantity. It has been found that two bricks bedded together crossways, having a sectional area of 20 square inches, required in Portland, after 35 days, 309 lb. to pull them asunder; while it required 556 lb. to separate the bricks bedded in Selenitic. As regards cost, Selenitic is about one-half the price of Portland. We know of no system of building in concrete blocks, but we are nevertheless certain if such a system were adopted, there is nothing to prevent its success. Selenitic cement is largely used by Messrs. Drake and others in their filling-in process, with excellent results. It would be found equally suitable if made into blocks, and built with when thoroughly set.—THE MANAGER OF THE SELENITIC CEMENT COMPANY.

### CHIPS FROM NEW YORK.

The Palace Hotel, now building in San Francisco, has a frontage of 350 ft. and a depth of 275 ft., is six stories in height, contains 700 rooms, and will have a pavilioned roof. The total cost, estimated at \$550,000, is thus stated: land, \$200,000; building, \$250,000; furniture and fittings, \$100,000.

Two out of the five theatres in New Orleans are undergoing extensive alterations; and the Academy of Music has been enlarged so as to increase its capacity from 1,800 to close upon 2,500 persons.

The Skull and Bones Club at Yale College has been engaged in the improvement and fitting-up of the windowless building of freestone which it owns. This is now valued at \$6,000.

We have received from Mr. R. M. Upjohn, architect, New York, a photograph from a perspective drawing of the N.E. view of the State Capitol now building on the site of the Trinity College, Hartford. The building is 300 ft. long and 200 ft. in the middle part, and is, on the whole, one of the finest architectural productions we have seen from the States.



## STAINED GLASS.

**BIRMINGHAM.**—On Saturday a new stained-glass window was unveiled in St. Asaph's Church, Birmingham. Mr. Heritage, of Marshall-street, is the artist. The two side-lights represent the Children brought to Christ by their mothers, with figures of the disciples rebuking them. The centre light contains the figure of Christ, with the inscription, "Suffer little children."

**MANCHESTER.**—A stained-glass window has just been placed in Manchester Cathedral by Mrs. Bowers, in memory of her husband, the late Dean. It is situated at the north-east end of the "Derby Chapel," and comprises four lights, with tracery above. The subject which is contained in the two centre lights (from St. John xx. 14 and 15) represents the risen Saviour appearing to St. Mary Magdalene. On either side of the centre lights are the single figures of the Virgin and St. John. In the tracery are the figures of St. Stephen and St. James; St. George and St. Denys, to whom (with the Virgin) the Collegiate Church was first dedicated; a choir of angels; St. John Baptist, the patron saint of the chapel, and Isaiah. The whole is executed by Messrs. Burdison and Grylls, London.

## STATUES, MEMORIALS, &amp;c.

**BIRMINGHAM.**—A memorial-statue to Dr. Priestley, the discoverer of oxygen, was unveiled at Birmingham on Saturday week. Mr. E. J. Williamson, a pupil of Mr. Foley, is the sculptor of the statue, which is of white marble, 8ft. 6in. high, mounted on a lofty pedestal.

**BRADFORD.**—On Saturday week the statue erected in front of the Bradford Town Hall in commemoration of the public services of Sir Titus Salt was uncovered. Mr. J. Adams-Acton, of London, is the sculptor of the statue, and the Gothic canopy which covers it has been designed by Messrs. Lockwood and Mawson. The base of the canopy is surrounded by three flights of steps, forming a platform, upon which is placed a square base. At the four angles rise grouped shafts of variegated Shap granite, supporting the arches which carry the upper part of the memorial. Over each of the shafts is a crocketed pinnacle, with angular shafts, filled in with diaper work. The canopy itself is composed of four stones, which form a groined roof, with moulded ribs and a large pendant boss in the centre. From these arches springs the main body of the canopy, with angular buttresses, supporting lions carrying shields. The upper stage is composed of arches on each face, with crocketed pinnacles at the angles, surmounted with gables, and filled in with diaper work. The arches contain statuettes, each with its symbol, representing Justice, Prudence, Temperance, and Charity. The whole is surmounted by a spire, rising to a height of 40ft. from the street level, and finished with a foliated finial. The statue is 7ft. in height. Sir Titus is seated in a chair, attired in ordinary costume. The figure was cut from a block of Carrara marble, ten tons weight. The upper part of the statue is pure white, but the arms, legs, and a portion of the body are slightly veined. The canopy is built of Cliffe Wood stone. The work has been executed throughout by Messrs. Farmer and Brindley. The cost of the statue was 1,000 guineas, and £1,500. 10s. has been expended upon the canopy.

**ENDERBY.**—The unveiling of the Brook Memorial at Enderby, took place on Wednesday week. It is based upon stone steps placed on a raised platform of earth, and consists of a pedestal of polished Shap granite. Upon the pedestal is a group of short clustered columns, of polished white Sicilian marble, with ornamental capitals, and on the front one at the base, a medallion portrait in relief of Mr. Brook. Above all is the Angel of Charity, with a sick girl on the right hand; on the left hand a boy; and in front a dove fluttering from the hands of the figure. The design was given by Mr. J. B. Everard, of Leicester, and the work has been carried out by Messrs. Thrall and Vann, of Leicester.

## WATERSUPPLY AND SANITARY MATTERS.

**CLIFTON.**—The Clifton Union Rural Sanitary Authority having determined upon effectually sewerage and disposing of the sewage of Westbury-on-Trym, Shirehampton, and Stoke Bishop, have selected plans prepared by Messrs. Russ and Minns, of Westminster, and resolved to purchase land on which to utilise the sewage in irrigation, instead of allowing it to pollute the rivers Trym and Avon.

**LEEDS.**—The first general half-yearly meeting of the Clarifying and Utilisation of Sewage Company (Limited) was held at the Victoria Hotel, Leeds, on Tuesday week; Mr. Horsfall in the chair. In the Chairman's report he stated "that since the last meeting of the shareholders the directors had been able to materially strengthen the position of the company, by arranging terms for the purchase of Messrs. Marsden and Collins' letters patent for purifying sewage. The experiments at Knostrop in treating upwards of twelve millions of gallons of the Leeds sewage had been successfully carried out. The company's process is in work at several mills, and also at the Corporation works at Bolton, Lancashire. The directors having agreed with the Sewage Committee of the borough of Leeds to open the new works at Knostrop, and to treat the whole of the Leeds sewage, amounting to about 7,500,000 gallons per day, for a period of three months, they hope to have the system in full

operation there during the present month. After an analysis of a sample of effluent water from Bolton Corporation, Dr. Voelcker pronounced it to be the most successfully treated sewage that had been submitted to him.

**SANITARY JURISDICTION.**—Addressing the sanitary authorities of Warwick, the Local Government Board state: "A sanitary authority has no right to interfere in questions between riparian owners as regards their respective rights in inflowing water, and a sanitary authority cannot take proceedings to protect a water-course from pollution, unless such pollution arises from sewage, and is of such a character as to render the watercourse so foul as to be a nuisance. As a general rule, the Board hold that it is not incumbent on a rural sanitary authority to provide except for the reception of the sewage."

**THE BALTIMORE SYSTEM OF SCAVENGING.**—It is stated that in Baltimore a system of scavenging has been in use for 20 years which works well for the health and cleanliness of the city. Each householder is required every day during the hot weather to place the refuse of his house—the animal and vegetable matters in one box, the ashes and dry refuse in another—ready for the "garbage-carts." These carts are built with a movable partition, by which the dry and the wet are kept separate during transport to the outskirts, where a careful conversion of the whole to economical uses is carried on. Bones, rags, and scraps of paper, when sorted yield a handsome profit; old boots and shoes roasted, and reduced to powder, are used in the case-hardening of iron; and coal and cinders are valuable as fuel or in the mending of roads. Cess-pools are emptied by a pneumatic suction system, which mitigates the offensiveness of the operation; the contents are mixed with ashes, and are thereby completely deodorised in fifteen minutes; and this mixture meets with a ready sale as a fertiliser at 15 to 20 dollars the ton.

## LAND AND BUILDING SOCIETIES.

**THE IMPROVED INDUSTRIAL DWELLINGS COMPANY.**—The half-yearly report of this company states that at the date of the last report, the capital subscribed amounted to £226,210, and the directors are glad to say that immediately after the issue of the report the shares then unallotted were taken up. The whole of the capital is therefore now subscribed. During the half-year the sum of £452. 12s. has been paid on account of balances due on contracts completed, and £18,753. 18s. in respect of works in progress. The total expenditure on capital account is now £276,754. 5s. 4d. The unproductive capital, i.e., capital expended on works in progress, has amounted to £34,215. 1s. 7d. The sum expended in preliminary expenses of new capital will be written off at the debit of revenue account when all the shares are paid up. The rents, &c., amount to £12,228. 0s. 10d.; and dividend on railway stock, and other items, amounting to £350. 0s. 4d., make the total income £12,578. 1s. 2d. The total expenditure, including the contributions to the leasehold redemption funds and repairs account, amounting respectively to £119. 17s. 4d. and £1,465. 10s., has been £7,201. 14s. 6d., leaving a profit of £5,376. 6s. 8d. Of this amount, £493. 4s. 5d. repaid to the Commissioners during the half year, has been carried to the Public Works Loan Redemption Fund; and the balance, viz., £4,883. 2s. 3d. added to the balance £325. 7s. 3d., brought forward from last half-year, gives a total of £5,208. 9s. 6d. available for dividend. No interest has been charged in respect of the large sum of £34,215 expended on works in progress, as above referred to, or at 5 per cent. revenue would have been improved by about £855. The directors recommend the payment of the usual dividend at the rate of 5 per cent. per annum, free of income tax, which will absorb £3,413. 19s. 7d., and leave a balance of £1,794. 9s. 11d.; that £1,500 be added to the reserve fund for the equalisation of dividends; and that £294. 9s. 11d. remaining, be carried forward to the next half-year's account.

## LEGAL INTELLIGENCE.

**ACTION FOR THE COST OF A REREDOS.**—**EARP V. ROYDS.**—This case was tried in the Crown Court, at the Salford Summer Assizes, last week, before Mr. Baron Pollock. The plaintiff is a sculptor, the defendant was a gentleman residing in Falinge, near Rochdale, and the action was for work done. In 1868, a movement was started for the erection of a new church in Falinge, the cost to be defrayed by public subscription, and a committee having been formed, Mr. Gilbert, the clergyman of the parish, called on Mr. Medland Taylor, an architect in Manchester, and spoke to him about the preparation of the plans. Nothing further was done until 1869, when the defendant announced his intention to build the church at his own expense and present it to the district. Mr. Taylor then prepared the plans, and after he had submitted them to the defendant, and discussed them with him, the defendant said he was willing to spend £100 on a pulpit and about £300 on a reredos. Mr. Taylor made a drawing of a reredos, and asked the plaintiff for an estimate of the cost. The plaintiff gave him an estimate for £300, and Mr. Taylor having submitted the plan and estimate to the defendant and obtained his approval of them, the order for the reredos was given to the plaintiff, who executed it. The defendant subsequently took the building of the church into his own

hands, and had it carried on by builders; but when the plaintiff sent in his account for the reredos, the defendant refused to pay for it, saying that he had not given the order. Mr. Medland Taylor, the architect, was examined, and stated that the defendant had approved of the plan of the reredos in question, and had authorised him to get it made. Mr. Albert H. Roys, the defendant, was examined, and stated that he had not approved of the plan of the reredos, nor authorised any order being given for it. On the contrary, when Mr. Taylor showed him the plan he said it was a marble chimney-piece, and he would not have such a thing if it was given to him. He said if he put up anything of a reredos it should have upon it the Lord's Prayer, the Ten Commandments, and the Belief. The jury returned a verdict for the plaintiff for £200, and Earp to keep the reredos.

**COMPENSATION CASE.**—**GOVER V. THE METROPOLITAN BOARD OF WORKS.**—In this case, heard at the Sheriff's Court, Red Lion-square, last week, before Mr. Under-Sheriff Burchell and a special jury, the claim was for £7,630, for a freehold property comprising 4,980 square feet, with a frontage of 16ft. to Turnmill-street, Clerkenwell, and including a number of cottages and stables let to costermongers and others, and forming part of a wretched neighbourhood known as "Little Hell." The witnesses on behalf of the claimants (Mr. Henry Gover, of the London School Board, and Mr. William Sutton Gover, the Chairman of the Commissioners of Sewers) were Messrs. Edwin Fox, F. J. Clarke, and George Prickett, who assessed the value of the property, now producing a nett rental of £125 per annum, at sums amounting to an average of £6,700; while, on the part of the Board, Mr. John Wimble, Mr. Robert Vigers, Mr. Porter, and Mr. E. N. Clifton valued the property at from £2,200 to £2,750. The jury gave a verdict for £3,600, being, it is said, £400 less than the amount offered by the Board. [We are glad to see that this wretched property is about to be demolished, the ground being required for the formation of the new street from Oxford-street to Shore-ditch.]

**DANGEROUS STRUCTURES.**—On Tuesday week, at Southwark Police Court, Mr. Shaw, surveyor, of 9, Hart-street, Bloomsbury, was summoned before Mr. Benson, the magistrate, by Mr. Napier, of the Solicitor's Office of the Metropolitan Board of Works, to show cause why he should not pull down the back part of a house in the New Kent-road. Mr. Cæsar A. Long, district surveyor, said his attention was called to the cottage in question. He found the back walls to be cracked, and so bulged out as to be dangerous. The house was inhabited, and the lives of the persons were not safe. He had carefully examined the walls, and considered that the whole of the back part of the house ought to be pulled down as soon as possible. The defendant said he was a surveyor, and knew as well as Mr. Long did what should be done to the house. There was not a crack in the walls.—Mr. Long said he would not be answerable for the lives of the people unless the walls were pulled down.—Mr. Benson observed that the Act specified that the defendant should have notice to shore up the walls first.—Mr. Napier replied that it was not necessary in this instance. The 73rd section of the Act gave power to shore up for the protection of the public, but these were back walls, and all that was requisite was to order the walls to be pulled down.—The defendant said he should not pull them down; the Metropolitan Board might shore them up if they liked.—Mr. Napier intimated that they would have them shored up and afterwards pulled down at the cost of the defendant.—The magistrate made the orders.

**DISTRICT SURVEYORS' FEES.**—At the Hammer-smith Police Court on the 31st ult., Mr. Knightley, District Surveyor, appeared before Mr. Ingham, the magistrate, in support of an adjourned summons against Mr. John Parish, the builder of three houses in Denmark-road, for refusing to pay the district surveyor's fees. Mr. Claydon, solicitor, appeared for the defendant, and stated that his client was neither the builder, owner, nor occupier, and therefore was not liable, and produced a witness who was the owner of the houses in question, who stated that the defendant had carried out the work for her as her foreman. Mr. Knightley here produced the written notice given by defendant before commencing the work, which was signed by him as the builder, and which described witness as the owner, in addition to which it was shown by Mr. Knightley that he had in every way acted as the builder throughout, and was therefore liable for the payment of district surveyor's fees, and although in the case of two of the houses the main buildings had been carried up and roofed in by another person, yet the back additions having been carried up and roofed in by defendant, who also finished the houses, he alone was liable for payment of the full fees. The plea was then set up that defendant, who was an illiterate person, had been inveigled into giving the notice by the assistant to Mr. Knightley; but the magistrate remarked that this was improbable, as defendant wrote and spelt very well, and was able to judge of the nature of the notice. He therefore made an order for the amount claimed, with 4s. costs.

**THE EXETER REREDOS CASE.**—Notice of appeal in the case of "Boyd and others v. Philipotts," has been lodged at the Registry of the Arches Court by Messrs. Moore and Curry, the proctors for Archdeacon Philipotts, and the matter will be heard, if proceeded with, before the Judicial Committee of the Privy Council on the two questions whether the Dean and Chapter of a Cathedral can make additions or altera-



tions without a faculty, and also whether the representation by images of the work of redemption on a redos are legal. The appeal to the Judicial Committee, unless by special order, cannot be heard for several months.

**VALUE OF LAND AT CHARING-CROSS.**—The first disputed claim of compensation for freehold property required by the Board of Works for the new approach to the Victoria Embankment was tried before a jury at the Guildhall, Westminster, on Saturday. The premises in question consisted of the freehold house known as No. 1, Charing-cross, adjoining Northumberland-house, occupying a ground area of only about 240 superficial feet, let on lease to Mr. Bax at £140 a year. Messrs. Fuller, of Bucklersbury, had sent in a claim to the Board on behalf of Mr. Bird, the freeholder, for £5,000, exclusive of the usual percentage allowed for compulsory sale, and, as the Board only offered £3,500, the case came on for hearing. Numerous witnesses were called on both sides, Mr. Clark and Mr. Glaser supporting Messrs. Fuller's figures, while Mr. Abbott, Mr. Driver, and others gave estimates considerably below them. In the end the jury returned a verdict for £4,400, being at the rate of nearly £22 per foot, after allowing the tenant's interest in the lease.

## Our Office Table.

**INDIAN ARCHÆOLOGY.**—Professor Max Müller has published an interesting paper by the Director-General of the Archaeological Survey, showing the extreme value of the discoveries which that officer has recently made in the Jubbalpoor district. Indian archaeologists already owe a large debt of gratitude to General Cunningham, but it is not too much to say that his latest excavations may inaugurate a new era in the history of Indian scholarship. In the sculptures and inscriptions of Bharahut we shall have in future a real landmark in the religious and literary history of India, and many theories hitherto held by Sanskrit scholars will have to be modified accordingly. Mr. Max Müller particularly points out the valuable information conveyed by one piece of the recently-excavated sculptures, which represents the purchase of the garden near which one of the most celebrated Buddhist monasteries was erected during the lifetime of the founder of the religion. Prince Jeta, to whom the garden belonged, refused to part with it unless it was in the first instance paved with coins, which were then to be made over to him as its price. The surface of the garden is here represented as covered with coins, like the squares of a chess-board. The coins of this particular period were square, and so they are cut upon this ancient stone. There is the cart, too, in which the money was brought, and by its side two men are standing, each having in his hand a square coin; and two other figures, also provided with money of the same shape, are engaged in laying down this costly pavement. It is hoped these interesting sculptures, if they come to England, will be better cared for than those collected by Sir Walter Elliot, which were left uncovered in the courtyard of Duff House to test the effect of an English winter on their ancient surfaces.

**CRYSTAL PALACE SCHOOL OF PRACTICAL ENGINEERING.**—On Saturday the usual distribution of awards to the successful pupils of the School of Practical Engineering, Crystal Palace, took place under the presidency of Mr. Jabez Church, President of the Society of Engineers. The report of the examiners expressed their decided appreciation of the value of the course of instruction, practical and theoretical, given, and their opinion that the general state of efficiency did great credit to the principal. Of the sixteen gentlemen who passed for the examination upon the subject of "Railways, their Construction and Appliances," Mr. W. H. B. Green obtained the highest number of marks, viz., 201 out of 232, the highest attainable. In the drawing office, Mr. J. Saunders; in the pattern shop, Mr. A. H. Turner; in the fitting shop, Mr. W. H. B. Green; and in the civil engineering section, Mr. P. W. Britton, obtained the highest places, but several others also obtained certificates.

**LONDON AND COUNTY BANKING COMPANY.**—The half-yearly general meeting of the proprietors of this company was held last week at the Cannon-street Hotel, Mr. Frederick Francis in the chair. It appeared from the report for the half-year ended 30th June last that, after paying interest to customers and all charges, allowing for rebate, and making provision for bad and doubtful debts, the net profits amounted to £125,830. 16s. 1d. This sum

added to £23,917. 13s. 3d. brought forward from the last account produces a total of £149,748. 9s. 4d. The directors have declared a dividend for the half-year at the rate of 20 per cent. per annum, which will absorb £120,000, and after reserving £468. 15s. to meet interest accrued on new shares, there remains a balance of £29,279. 14s. 4d. to be carried forward to profit and loss new account.

**ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS.**—The second "outing" in connection with the Home Counties branch of this Association took place on Wednesday last, when the sewage works at Tottenham were visited, after which the members proceeded to the Alexandra Palace, and having examined the works there in progress, a meeting was held for the reading and discussion of papers. A copious report of the proceedings is postponed, for want of space, until next week.

**THE BRITISH ASSOCIATION.**—The forty-fourth assembly of this Association opens on the 19th instant at Belfast. The first general meeting will be held on Wednesday, the 19th, when Professor Williamson, Ph.D., F.R.S., F.C.S., &c., will resign the chair, and Professor Tyndall, D.C.L., F.R.S., president elect, will assume the presidency and deliver the opening address. On Thursday evening, 20th, there will be a *soirée*; on Friday evening, 21st, a letter by Professor Huxley, F.R.S.; on Monday evening, 24th, a discourse will be delivered by Sir John Lubbock, Bart., M.P., F.R.S.; on Thursday evening, 25th, a *soirée*; and on Wednesday, 26th, the concluding general meeting will be held at 2.30 p.m. The various sections will assemble for business on Thursday, 20th; Friday, 21st; Monday, 24th; and Tuesday, 25th. At 11 o'clock on Saturday, the 22nd, and Thursday, 27th, there will be a series of excursions to places of interest in the neighbourhood.

**THE TRINITY CORPORATION AND THE LIGHTHOUSES.**—Mr. H. H. Doty has published a pamphlet reflecting on the wisdom of the Trinity Corporation displayed in their recent refusal to adopt his invention, by which mineral oils are substituted for colza oils in the illumination of lighthouses, as he claims, to the greater advantage of maritime commerce, and with a great decrease in cost. Mr. Doty's system is, it appears, now generally or partially adopted for the coast lights of France, Scotland, Norway, Denmark, Sweden, Russia, Prussia, Belgium, Japan, China, Newfoundland, New Zealand, and other countries, and he avers that had it been accepted by the Trinity House on his first offer, in 1868, the saving in lighthouse dues to the British Shipping Community would have exceeded £100,000, besides augmenting the value of their coast lights. He also accuses the Corporation of unfair conduct during the recent competitive trial of his burners, and of partiality towards other makers.

**THE ARCHITECTURAL VISIT TO PARIS.**—The following is a translation of a letter from the Minister of Interior to Mr. Edmund Sharpe:—"You have been desirous to obtain the intervention of my administration on the occasion of an excursion that you propose to make in France, with a certain number of members of the Architectural Association of London, in order to visit our archaeological monuments of the departments of the centre and north of France. I have the honour to inform you that I have given notice of this project of excursion to Messieurs the Prêfets of the Departments of Oise, Seine and Oise, Seine Inferieure, Eure and Loire, Eure, Aisne, and Marne, and have invited them to forewarn the local authorities of each of the towns that will be visited by your society. If you desire that the architects or conservators of any of these monuments should be placed at your disposition, it will suffice that you announce the day of your visit to the Prêfet of each department. These officers will be happy, I do not doubt, to lend their assistance to the studies of the Architectural Association of London."

**BUILDING MATERIALS IN NEWFOUNDLAND.**—A correspondent of the *Scottsman* states that there is an unlimited quantity of superior limestone on the eastern coast of Newfoundland, principally in White, Notre Dame, and Trinity Bays; some of it is capable of receiving a high polish, and making splendid marble, that from White Bay especially being remarkable for the purity of its whiteness and the fineness of the polish it takes, rendering it almost equal to the famous Carrara marble, while in many other

places it exists in abundance and in great variety of colour. Roofing slates are also found in plenty both in Trinity and Bonavista Bays; a quarry has been worked to some extent in Smith's Sound, Trinity Bay, but local demands are few and small. Canada can supply herself, and the present prohibitory duty in the United States prevents shipment being made thither. The quality of the slates in Trinity Bay is fully equal to the best Welsh.

## CHIPS.

The half-erected church which has for so many years stood near the entrance to the Railway-station, at Herne Bay, is shortly to be removed and sold, and the proceeds reinvested till such time as another building may be commenced with a better chance of completion, or the money be better disposed of for Church purposes.

The new streets and squares opened and placed in charge of the Metropolitan police during the year were 154 in number, and with one square covered 26 miles and 890 yards. This is an increase on the last year, when only 20 miles of new streets were opened, but it is still much below the average of former years. The number of new houses built during the year was 7,687, a considerable reduction on former years. In 1872, 11,179 new houses were built.

The City-road Wesleyan Chapel, London, having been thoroughly cleaned and redecorated, will be reopened on Sunday next.

The memorial-stone of a new School, in connection with Carey Baptist Chapel, Reading, was laid on Wednesday week.

St. Mary's Episcopal Chapel, Reading (which was erected in the year 1799), is shortly to undergo extensive alterations and improvements.

The Tranch church, Pontypool, was reopened, after enlargement, on Monday week.

The foundation-stone of a new Methodist Chapel, was laid at Totterdown, near Bristol, on Tuesday.

At St. Joseph's Retreat, Highgate, a monastery to accommodate forty is about to be erected. Mr. Tasker, of Fumival's Inn, is the architect. The style will be Italian.

A district meeting of the Lancashire and Cheshire branch of the Association of Municipal and Sanitary Engineers was held on Friday last, at Barrow-in-Furnace. Mr. Jacob, Borough Surveyor, read a paper on the rise and progress of the town, and the members afterwards dined together. On the following day a tour was made through the Lake district.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHUTTING AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB AND SON,  
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## Trade News.

### WAGES MOVEMENT.

**NORTH WALES.**—The three thousand men on strike at Lord Penrhyn's Carnarvon Slate Quarries resolved at a meeting on Monday that as his Lordship had not replied to their demands, they should at once disperse in search of work at other quarries.

**PONTEFRAC.**—On Monday morning upwards of sixty bricklayers and labourers employed under the various master builders in Pontefract left work, refusing to start unless the time for commencing work in future be at seven in the morning instead of six as at present.

## The Timber Trade.

Wholesale prices of Timber, deals, &c.  
Per 50 cubic feet.

	s.	d.	s.	d.
Red pine, for yards and spars	90	0	130	0
" Mixed and building	70	0	80	0
Yellow pine, large	110	0	130	0
" waney board	110	0	130	0
" small	80	0	90	0
Pitch pine	75	0	85	0
" for masts and spars	95	0	125	0
Quebec oak	160	0	180	0
Rock Elm	150	0	160	0
Ash	140	0	160	0
Birch, Quebec, large	110	0	160	0
" N. Brunswick, &c.	85	0	110	0
" small averages	70	0	80	0
Masts, red pine	90	0	120	0
" large yellow pine	80	0	130	0
" Oregon	180	0	240	0
" Kawrie	100	0	120	0
" Norway spars	40	0	60	0



	s.	d.	s.	d.
Indian Teak . . . . .	22	0	28	0
Riga fir . . . . .	80	0	85	0
Danzic and memel crown . . . . .	90	0	110	0
" best middling . . . . .	80	0	100	0
" good middling and 2nd . . . . .	75	0	90	0
" common middling . . . . .	70	0	80	0
" undersized . . . . .	55	0	65	0
" small, short, and irregular . . . . .	50	0	60	0
Stettin . . . . .	60	0	70	0
Swedish . . . . .	60	0	65	0
" small . . . . .	50	0	58	0
Swedish and Norway balks . . . . .	40	0	55	0
Memel crown oak . . . . .	110	0	160	0
" brack . . . . .	105	0	150	0
Danzic and Stettin crown oak . . . . .	110	0	160	0
" brack and unsquared . . . . .	100	0	120	0
British Gulana greenheart . . . . .	250	0	270	0
Australian Ironbark . . . . .	170	0	220	0

Per superficial foot.

	d.	d.	d.	d.
Honduras mahogany, cargo average . . . . .	4	5		
Mexican . . . . .	4	5		
Tabasco . . . . .	5	6		
Cuba . . . . .	7	10		
St. Domingo . . . . .	7	10		
" curls . . . . .	12	2½		
Cuba cedar . . . . .	4½	5		
Honduras and Mexican cedar . . . . .	3½	4½		
Australian . . . . .	3	4½		
Pencil . . . . .	2	3½		
Italian walnut . . . . .	4½	5		
Black Sea . . . . .	3½	4½		
Canadian . . . . .	3	4		
Bird's-eye maple . . . . .	5	7		
St. Domingo satin wood . . . . .	12	18		

Per ton.

	£.	s.	£.	s.
Bahama satin wood . . . . .	7	0	9	0
East India . . . . .	8	0	10	0
Rio rosewood . . . . .	14	0	20	0
Bahia . . . . .	12	0	18	0
Puerto Cabello zebra wood . . . . .	7	0	8	0
Ceylon ebony . . . . .	12	0	18	0
African billet do. . . . .	12	0	15	0
Lignum vitae . . . . .	6	0	10	0
Cuba cocus wood . . . . .	5	0	7	0
Turkey boxwood . . . . .	5	0	16	0

Per foot run.

	d.	d.	s.	d.
Norway poles . . . . .	2	3		
Each . . . . .			0	10
Rickers . . . . .			0	10
Lancewood spars, fresh . . . . .			6	0
" ordinary to fair . . . . .			3	0

Per 18 cubic feet.

	£.	s.	£.	s.
Riga crown wainscot (English and Dutch) . . . . .	120	0	135	0
" brack . . . . .	95	0	100	0
Memel crown . . . . .	95	0	110	0
" brack . . . . .	75	0	85	0

Per cubic fathom

	£.	s.	£.	s.
Petersburg lathwood . . . . .	10	0	11	0
Riga, &c., . . . . .	8	0	9	0
Swedish firewood, deal ends . . . . .	6	0	6	10
Norway . . . . .	4	10	6	0
" boards & clubs . . . . .	3	10	4	0

Per mille of pipe.

	£.	s.	£.	s.
Crown Memel staves . . . . .	250	0	270	0
Brack . . . . .	220	0	230	0
Danzig, Stettin, and Hambro. . . . .	200	0	220	0
Canadian standard pipe . . . . .	80	0		
" puncheon per 1200 pcs. . . . .	20	0	22	0
Bosnia single barrel . . . . .	31	0		
United States pipe . . . . .	50	0	72	10
" hogshead, hvy. & ex. . . . .	30	0	45	0
" slight . . . . .	20	0	21	0

Per 120 12ft. 1½ × 11in.

	£.	s.	£.	s.
Quebec 1st floated pine . . . . .	20	0	23	0
" 2nd . . . . .	15	0	15	10
" 3rd . . . . .	12	10	13	0
" 1st bright . . . . .	21	0	26	0
" 2nd . . . . .	15	0	17	0
" 3rd . . . . .	12	10	13	10
" 1st spruce . . . . .	13	0	13	10
" 2nd . . . . .	10	10	11	10
" 3rd . . . . .	10	10	10	15
St. John's . . . . .	10	0	11	0
" buttons . . . . .	9	10	10	10
Archangel 1st yellow . . . . .	16	10	17	10
" 2nd . . . . .	14	10	15	0
Petersburg 1st . . . . .	13	10	15	10
Wyburg - 1st . . . . .	13	10	14	10
Swedish mixed . . . . .	15	0	16	0
" 3rd . . . . .	14	0	15	0
" 4th . . . . .	13	0	14	5
Finland deals, 1st . . . . .	13	10	14	10
" battens . . . . .	12	10	14	0
" handsawn deals . . . . .	10	10	11	10
" battens . . . . .	9	10	11	0

Per 40 feet 3 inch.

	£.	s.	£.	s.
Danzig crown deck . . . . .	25	0	32	0
" brack . . . . .	17	0	22	0

## TENDERS.

ANERLEY.—For new probationary ward at the North Surrey District Schools. Mr. A. G. Hennell, architect. Downs and Co. £3,200 0 0

BETHNAL GREEN.—For works in Bethnal Green. Messrs. W. G. Habershon and Pite, architects, 38, Bloomsbury-square, W.C.

	Hall.	Club.	Dwellings.	Total.
Allen and Son . . . . .	£2,000	£810	£1,090	£3,900
Saby and Son . . . . .	1,924	899	1,069	3,882
Roberts . . . . .	1,946	838	1,069	3,853
Morgan . . . . .	1,879	804	1,039	3,722
Woodward . . . . .	1,870	795	1,054	3,719
Martin . . . . .	1,875	835	1,067	3,717
Shurmer . . . . .	1,845	799	1,018	3,663
Terrard . . . . .	1,824	781	1,036	3,646
Bangs and Co. . . . .	1,845	770	1,027	3,642
Ennor . . . . .	1,823	768	1,095	3,686
Niblett and Son . . . . .	1,797	757	995	3,559
Boden . . . . .	1,775	785	987	3,547
Webber . . . . .	1,730	758	982	3,470
Leathdale and Son . . . . .	1,661	737	979	3,377
Hunt . . . . .	1,659	726	908	3,295
Smale . . . . .	1,635	702	909	3,246
Chivers . . . . .	1,600	660	940	3,200
Stamp and Bowtle . . . . .	1,611	667	919	3,187
Waldron and Co. . . . .	1,577	583	957	3,117
High . . . . .	1,520	500	920	2,940

BRIDGEMORE.—For additions and alterations to "The Mount," for Mr. Wm. Green. John Cotton, architect, Birmingham. Quantities supplied.

	1st.	Credit.	Net.
Steel . . . . .	£1,950	0 0	
Wood and Sons . . . . .	1,797	0 0	
Mathews and Son . . . . .	1,765	0 0	
Foster . . . . .	1,640	0 0	
Hardwick and Son . . . . .	1,635	0 0	
Brooks . . . . .	1,583	0 0	
Harris and Fisher . . . . .	1,529	0 0	
Brazier and Weaver . . . . .	1,525	0 0	
Read . . . . .	1,500	0 0	
Walford (accepted) . . . . .	1,453	0 0	

CHELSEA.—For works at the new Patent Safety Pan-technicon, King's-road. Messrs. Taylor, Milsted, and Clark's patent. Messrs. Pain and Clark, architects.

	1st.	Credit.	Net.
Oliver . . . . .	£4,812	£357	£4,462
Manley and Rogers . . . . .	4,906	350	4,556
Kelly Bros. . . . .	5,200	500	4,700
Stimpson and Co. . . . .	4,976	180	4,826
Cooke and Green . . . . .	5,479	150	5,329

COLCHESTER.—For the erection of a school chapel, Old Heath, for the Rev. W. H. Wardell, M.A. Mr. G. Gard Pye, architect.

	£.	s.	d.
Dupont . . . . .	562	0	0
Maister . . . . .	530	0	0
Dobson . . . . .	529	0	0
Farian . . . . .	515	9	9
Shepherd . . . . .	498	0	0

CRADLEY, NEAR STOURBRIDGE.—For the erection of a campanile or bell tower to the parish-church. John Cotton, architect, Birmingham.

	£.	s.	d.
Bloomer . . . . .	£1,481	0	0
Nelson (accepted) . . . . .	1,341	0	0

DERBY.—For villa residence, Osmaston-road, for Miss S. A. Brown. Mr. George Thompson architect. Quantities supplied.

	£.	s.	d.
Riley (accepted) . . . . .	£2,217	0	0

FOREST HILL.—For stabling and conservatory, Quar-rington House. Mr. A. G. Hennell, architect.

	£.	s.	d.
Downs and Co. . . . .	£945	0	0
Amer . . . . .	870	0	0
Masters . . . . .	850	0	0
Williams and Son (accepted) . . . . .	829	0	0

HERTFORD.—For building a school for infants and girls in the parish of St. Andrew's, for the Committee. Messrs. Wm. Wilder and Son, architects. Quantities supplied.

	£.	s.	d.
Norris . . . . .	£215	17	0
Ekins and Son (accepted) . . . . .	709	0	0
Fisher . . . . .	677	0	0

HERTFORD.—For building a pair of cottages and a cottagers' reading-room, for Mr. Edmd. Potter, F.R.S., Camfield-place. Messrs. Wm. Wilds and Son, architects. Quantities supplied.

	£.	s.	d.
Gregory . . . . .	£1,065	0	0
Ekins and Son . . . . .	1,000	0	0
Bent and Son . . . . .	870	10	0
Chapman . . . . .	865	0	0
Collins (accepted) . . . . .	745	10	0

HOLBORN.—For decorations at the Freemasons' Tavern, Great Queen-street.

	£.	s.	d.
Hayward and Son (accepted) . . . . .	£197	17	0

ISLE OF WIGHT.—For Christ Church, Freshwater. Messrs. G. Habershon and Pite, architects, 38, Bloomsbury-square.

	£.	s.	d.
Coker . . . . .	£1,831	0	0
Bound . . . . .	1,639	0	0
Newman and Son . . . . .	1,515	0	0
Parsons . . . . .	1,489	0	0
Barnes . . . . .	1,472	0	0
Smith . . . . .	1,370	0	0
Burkett . . . . .	1,365	0	0

KINGSLAND.—For repairs and painting at the Coopers' Almshouses. Mr. G. B. Williams, architect.

	£.	s.	d.
Hayward and Son (accepted) . . . . .	£266	0	0

LEWISHAM HILL.—For a residence for Mr. F. Stallard. Mr. Wm. Oakley, architect. Quantities supplied by Mr. Sidney Young.

	£.	s.	d.
Crossley . . . . .	£4,469	0	0
Brass . . . . .	4,340	0	0
Sewell and Son . . . . .	4,279	0	0
Colls and Sons . . . . .	4,232	0	0
Newman and Mann . . . . .	4,226	0	0
Bayes and Ramage . . . . .	4,184	0	0
G. B. and W. T. Gates . . . . .	4,149	0	0

LONDON.—For alterations and painting to St. John's Church, Horselydown, S.E. Messrs. Newman and Billing, architects.

	£.	s.	d.
Phillips . . . . .	£548	0	0
Stevens . . . . .	470	0	0
Brighton . . . . .	465	0	0
Pitman and Cuthbertson (accepted) . . . . .	443	0	0

LONDON.—For rebuilding new dining room to Moutlet's Hotel, Newgate street. Mr. J. Viney, architect.

	£.	s.	d.
Hyde . . . . .	£594	0	0
Hayward and Son . . . . .	586	0	0
Goddan . . . . .	559	0	0
Pitcher and Son . . . . .	551	0	0

LONDON.—For painting and sundry works at Christ's Hospital, Newgate-street, for the Governors. Mr. S. Renton, architect.

	£.	s.	d.
Shaw . . . . .	£912	0	0
Pitman and Cuthbertson . . . . .	898	0	0
Patman and Fotheringham . . . . .	897	0	0
Morby . . . . .	879	0	0
Hayward and Son (accepted) . . . . .	825	0	0

LONDON.—For alterations and additions to 27, Moorgate-street, for Mr. A. R. Wormald. Mr. F. C. Dyer, architect.

	£.	s.	d.
Gould and Brand . . . . .	£97	0	0
Perkins . . . . .	993	0	0
Ward . . . . .	900	0	0

LONDON.—For alterations and repairs, 3, Crosby square, Bishopsgate, for Mr. P. Davies. Mr. C. Reilly, architect.

	£.	s.	d.
Norton . . . . .	£598	10	0
Watson . . . . .	496	13	0
Harrison . . . . .	421	0	0
Staines and Son . . . . .	364	0	0
Greenwood and Son . . . . .	758	0	0
Heeps (accepted) . . . . .	352	0	0

LONDON.—For new premises for the Hearts of Oak Society. Mr. T. Chatfield Clarke, architect.

	£.	s.	d.
Ashby and Sons . . . . .	£5,894	0	0
Colls and Sons . . . . .	5,828	0	0
J. and F. Coleman . . . . .	5,814	0	0
Conder . . . . .	5,780	0	0
Browne and Robinson . . . . .	5,750	0	0
Scrivener and White . . . . .	5,669	0	0
Newman and Mann . . . . .	5,632	0	0
Macey . . . . .	5,500	0	0
Patman and Fotheringham . . . . .	5,370	0	0
Merritt and Ashby . . . . .	5,330	0	0
Simpson . . . . .	5,089	0	0

LONDON.—For additions to 39, Berkley-square. Mr. M. P. Manning, architect. Quantities supplied by Mr. D. J. Brown.

Rowlands .....	2,500	0	0
Mann .....	2,287	0	0
Pope .....	2,180	0	0
Patrick .....	1,968	0	0
Colls and Son .....	1,914	0	0
Temple and Foster .....	1,720	0	0



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CARDIFF, Sept. 23.—For designs for the proposed Free Library, Museum, and Science and Art Schools. Mr. E. Payne, Hon. Sec., The Wharf, Cardiff.

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BATH, Aug. 18.—For constructing a stone and brick tank. G. Helps, Secretary, Bath Gaslight and Coke Co., Upper Bristol-road, Bath.

BROXBORNE, Aug. 31.—For the execution of sewerage works. Mr. T. W. Grindle, C.E., 205, Gresham House, Old Broad-street, E.C.

DONCASTER CORPORATION WATERWORKS, Aug. 18.—For the construction of a storage reservoir in the Silverwood Valley. Mr. B. S. Brundel, C.E., 1, Princes-street, Doncaster.

GUILDFORD, Aug. 21.—For repairs, &c., to the tower of St. Mary's Church. Mr. Withers, 122, High-street, Guildford.

HAY, BRECON, Aug. 24.—For the erection of a police station and residence, with magistrate's room attached. Mr. D. Thomas, Clerk of the Peace, Shire Hall, Brecon.

HEADINGLEY, LEEDS, Aug. 31.—For the erection of 16 dwelling-houses and outbuildings, near Shaw-la-c. Messrs. Hill and Swann, architects, Leeds.

KENNINGTON, Aug. 19.—For alterations to the Primitive Methodist Chapel and erecting schools. Mr. G. H. Fowler, 89, Mina-road, Old Kent-road, S.E.

KENILWORTH, Aug. 21.—For a survey and plans of the town. H. Consett Passman, Clerk to the Warwick Union Rural Sanitary Authority, Lower Bedford-street, Leamington.

KILDARE, IRELAND, Aug. 25.—For the erection of a new mansion at Pa'merston. Mr. F. Hayatt, 77, Great Russell-street, London, W.C.

LEEDS SCHOOL BOARD, Aug. 24.—For the erection of a new school at Rodley. Mr. W. Lee, Clerk to the Board, School Board Offices, Park-row, Leeds.

MAIDA VALE, Aug. 31.—For taking down and rebuilding No. 40, Maida Vale. H. M. Barton, Surveyor, 14, Spring-gardens, S.W.

MAIDENHEAD, Aug. 19.—For alterations and additions to the Cockham Union. C. Cooper, architect, 8, Park-villas, Braywick-road, Maidenhead.

METROPOLITAN BOARD OF WORKS, Sept. 24.—For the formation of carriage and footways in Wilderness-row, E.C. Sir J. W. Bazalgette, C.B., Engineer to the Board, Spring-gardens, S.W.

MIDDLESBROUGH, Aug. 19.—For the erection of St. John's National Schools. Messrs. Alexander and Henman, architects, Zealand-buildings, Middlesbrough.

MIDLAND RAILWAY, Sept. 1.—For the supply and erection of ironwork for widening bridges. Engineer's Office Midland Railway, Derby.

MIDLAND RAILWAY, Aug. 18.—For the erection of wagon repairing shops and other buildings at Kenilworth. J. Williams, Secretary, Midland Railway, Derby.

NEW WOTLEY, Aug. 21.—For the erection of 5 houses near the bottom of Tong-road. Mr. J. Ambler, architect, 5, Cookridge-street, Leeds.

NORTH AND SOUTH WESTERN JUNCTION RAILWAY, Aug. 20.—For the construction of a bridge and approaches near New Bridge station. Resident Engineer's Office, North London Railway, Broad-street Station, E.C.

OLD TRANEY, NEAR HULL, Aug. 20.—For the stone mason's work required in erecting a mansion. C. H. Chorley, architect, 19, Park-row, Leeds.

PHOSPHATE SEWAGE CO., Sept. 1.—For alterations and additions to the present sewage works at Herford. M. T. W. Grindle, C.E., 205, Gresham House, Old Broad-street, E.C.

RAMSGATE, Aug. 31.—For the erection of a new infant school in St. George's-road; and for additions and alterations to Christ Church Schools, Royal-road. Mr. Hodgson, High-street, Margate.

SALISBURY, Aug. 19.—For proposed additions to the Infirmary. Messrs. Williams and Taylor, surveyors, 12, Montague-street, Russell-square, W.C.

SOUTHAMPTON, Aug. 18.—For excavating for, and laying and jointing about 4,000 yards of cast-iron socket pipes R. S. Pearce, Town Clerk, Public Health Offices, Audit House, Southampton.

ST. MARY ABBOTTS, KENSINGTON, Aug. 19.—For the construction of 164ft. of 3ft. 9in. by 2ft. 6in. sewers and other works in Thistle Grove, Brompton; and about 260ft. of 3ft. by 2ft. brick sewer in Thurlow Mews. Mr. J. Broadbridge, Surveyor, Vestry Hall, Kensington.

ST. PANCRAS, Aug. 25.—For repairs to six houses in Clarendon-square. Mr. R. Parris, architect, 61, Kennington-road, S.E.

TONGE-CUM-ALKINGTON, Aug. 27.—For the erection of a school. Rev. J. Potter, The Vicarage, Tonge, near Middleton, Manchester.

TUNSTALL, Aug. 22.—For the erection of a vicarage house at Leek. Messrs. Garlick, Park, and Sykes, 33, Wickeysquare, Preston.

WAR DEPARTMENT CONTRACTS, Aug. 18.—For the erection of a block of buildings for married soldiers' quarters at the Cavalry barracks, Exeter. T. Howe, Surveyor, Royal Engineer's Office, Devonport.

WENTWODE, Aug. 19.—For sewerage and constructing a road. Mr. C. Fowler, architect, Britannia-building, Leeds.

WOLVERHAMPTON, Aug. 31.—For painting the exterior, and for painting and decorating the interior of the Town Hall. Borough Surveyor's Office, Town Hall, Wolverhampton.

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## THE BUILDING NEWS.

LONDON, FRIDAY, AUGUST 21, 1874.

## AQUARIA.

THE construction and arrangement of these edifices will probably become, before long, a distinct branch of industrial art applied to the requirements of science, not less important than the planning and building of winter gardens and conservatories. The idea is comparatively novel; for although from Grecian and Roman times the world has been familiar with the artificial breeding of fish in elaborately designed beds and tanks, it has only been in recent days that attempts have been made, on a large scale, to illustrate the geography, geology, and animal life of the sea, shallow or deep. But, once suggested, the proposal took root immediately. Aquaria have multiplied in Europe with amazing rapidity of recent years. Among the older are those of Hamburg and Brussels, both roughly planned and poor in their contents, resembling rather exaggerated grottoes than perspectives in the realm of natural history. Later additions of a nobler type have been made at Brighton and Sydenham, and it is now contemplated to rear others, of noble elevation, at Margate, Hastings, Scarborough, the Isle of Wight, and an open space contiguous to the Palace of Westminster and Westminster Abbey. No doubt the external aspects of the latter structure will be harmonised so far as possible—it is to be hoped so, at any rate—with the supreme architecture of the locality; but, at the best, a Gothic aquarium is a paradox, Nor, perhaps, was M. Lennier's celebrated erection at Havre very much superior in point of the proprieties. Yet it was of the water watery. The aquarium was a restoration of Fingal's famous cave, formed of huge black basaltic columns upholding a roof of basaltic rock, and rising from mighty masses of chalk. In the walls, spaces were hollowed and filled alternately with sea-water and fresh water, the completeness and variety of the collection surpassing all the rivalry that has hitherto been ventured. It is unnecessary to specify failures, or to force invidious comparisons: but it is only reasonable to indicate what the aquarium at Havre was, and what it was not. It was, to begin with, a model that might be studied without being copied; and it was not a naked stone corridor, lit from one side through barred windows, and crowded on the other by tanks resembling prison cells; it had not been inspired by a long acquaintance with Oxford-street bazaars, or goldfish globes. One magnificent illustration of nature was conjoined to another, and to this a third was added in the shape of a spacious lake surrounding the basement rock, and peopled by seals, turtles, and other marine animals, for the preservation of which separate receptacles would have been superfluous. A bridge (reproduced exactly from that of Staffa, leading to where Fingal's Cave opens desolately upon the sea) gave a reality to the whole which must, unfortunately, be absent from many similar works. Nor was the interior less unique. In a hall 500 yards square forty-two immense tanks were daily supplied with 1,000,000 gallons of salt water for the nourishment of sea creatures and vegetation. The very depths of the ocean were represented as they exist: stony bottoms literally converted into layers of living beings, which never cease their hold until they drop off in death. Every rising and falling tide changed the element in which they had their existence; the soil, so to speak, beneath the waves, was composed of their shells; in fact, the Havre aquarium—not to disparage its competitors—was a picture reflected from the most mysterious

recesses of the waters. This, however, is not intended as a scientific dissertation, but rather as a notice of the methods resorted to by the architects of Aquaria in order to carry out most successfully the purposes of their contrivers; for nothing can be more self-evident than that we are only at the commencement of this movement, and that, in due season, every important town of the United Kingdom, inland or maritime, will aspire to possess its aquarium. It is clear that a structure of this kind must include a number of different conditions in its several parts, and not be built for general effect alone; it must have its Atlantic and its Mediterranean; its archipelago and its coral wildernesses; and, unless adequate precautions were observed, one set of creatures would speedily be devoured by another. For instance, it would be madness to treat the herring on the same terms as the seal. At Havre, so perfect was the science developed, that many tanks appeared empty which absolutely teemed with life, so thorough was the union between the tints of the subaqueous rocks and the living myriads that swarmed immovably upon them, thus justifying the remark of M. Lennier, that no one except a geologist can construct an aquarium. It was to be regretted that the original edifice—a stroke of genius, should have vanished with the Exhibition of 1868; but it is not without a successor, larger in dimensions, and not less scientific if less picturesque in its dispositions. By general consent it is, with the fragments adopted from its predecessor, the most capacious, most perfect, and most interesting, from a practical point of view, ever planned. In the original, although, as we have said, the outlines were drawn from the epic grottoes of Staffa, the pearl of the Hebrides group, considerable latitude, for the sake of science, was permitted to the architect, so that, although the interior proportions, so far as regarded length and breadth, were tolerably accurate, the exterior roof was too flat, the elevation wanted height, and, viewed from the outside, the pile was anything but imposing. But the artist encountered many difficulties; he had to vivify, so to speak, a weird and ghastly rock, entirely apart from its historical and poetical condition; he had to reconstruct the many shattered ruins of the Giant's Causeway, the black basalt gates, and the sombre interior, by the contrasting aid of purely modern lamp-light. Reminiscences from the County Antrim, Ireland, and Puy-le-Dome, France, came thick upon the memory of the visitor associated with those artificial screens of melancholy spar; the strange twilight breaking through invisible apertures within, and the pyramid-like chambers, windowless and dreary, through the doors of which various landscapes were visible, not to be reproduced, as matter of course, in England, and least of all in Brighton, Margate, or London—that is so far as the exterior is concerned; but, with respect to the interior, there is no necessary limit to the completeness or beauty of the illustration. The artist at Havre, while faithful to nature, interpreted it at once most laboriously and most poetically; the riven mountains and fractured architecture of the submarine region, with fields of feathery vegetation, wastes of triturated shell, jewel-bright banks of sand, dens of marine monsters, corridors as if of castles drowned, shafted colonnades, or of deep-water Babylons—a wonderful microcosm, divided through its transept with one African and one American compartment, alive with breathing ugliness. Now, while the invention of the aquarium is assigned to the year 1842, when Dr. Johnstone, Mr. Ward, and Mr. Gosse made certain experiments with glazed tanks and living fish, these were not aquaria in either the strict or in the extended sense of the term; they belonging to window-ornamentation rather than to the class of buildings at present coming into vogue. The once

remarkable edifice in the Regent's Park, and its imitation at Paris, were marvels in their day. And so were the ingenuities of Mr. Gosse and Mr. Noel Humphreys. The latter naturalist carried his enthusiasm so far that he saw cities and villages beneath the sea; but the constructors of an aquarium will do wisely to keep their fancies in subjection, and not to erect aquaria of heroic dimensions, so to speak, as though they were simply intended for conservatories, corridors, and drawing-rooms. At Brussels there is a wide floor of slate, supporting pillars of birchwood, and overlaid with ~~various~~ of shell and sand, and varied growths of weeds, ~~the water~~ slightly muddy when it enters, coming gradually to a resemblance of pure sea-green crystal. At Hamburg, though the area is considerable, it is somewhat wantonly cut up, for the sake, it would appear, of a pedantic classification and cataloguing; whereas fish that will live together should live together, for the better appreciation of their habits, and the nearer approach of an aquarium to some natural reservoir of the earth. The study, however, is really a new one, as applied to the arrangement, on an appropriate scale, of a veritable sea-garden, which should be, at once, a landscape, the epitome of a vast creation, and a picture brightened by countless and nameless colours. Since the pursuit is a passion of the day, it may not be superfluous to accept a hint or two from countries where it is not so new as in England. The foreign aquarium architect is careful, even to delicacy, in the choice of the stone, the cement, and the sand, and, above all, the water, he uses. At Amsterdam he rejected the contents of the canals, and drew his fresh water from the Dunes, and his salt water from the Lake of Haarlem; and yet his experiments were not more than moderately costly. In point of ambition, we have eclipsed them by many degrees, though posterity is told, by the projectors of the grand Westminster experiment, that it will be but as a toy in comparison with achievements even now contemplated. "The day will arrive when we shall see the living Behemoth—the Titan of the Deep—rolling majestic in waves of his native element; perhaps pursued by his cruel enemy, the swordfish, or harried by a shoal of herrings, exemplifying to a London crowd the orgies of Yarmouth bloaters; or, we may see the dreaded shark floating round and round his vast glass prison, seeking his prey in crystal-walled seas." This is looking very far ahead, yet when the passage was written, such structures as those at Havre and Paris, and the Zoological Gardens, the Crystal Palace, and that now projected in Westminster, had not been so much as contemplated among possibilities of the future. There were successive efforts undertaken at the Surrey Gardens, the Zoological Society of Ireland, at Edinburgh, Galway, and Scarborough; still, nothing arose of any sufficient magnitude or wealth to challenge even the most inferior of the foreign structures, which we now bid fair to eclipse, except in so far as regards the hitherto matchless palace of sea-life at Havre. To this day, notwithstanding a few bold schemes, the aquarium is looked upon as a cabinet curiosity, and not as John Keats's "sounding grotto vaulted vast, o'er-studded with a thousand thousand pearls, and crimson-mouthed shells," and which are promising, at last, to come into vogue. It has to be determined, at present how much, in the framing and arrangement of these buildings, should be dedicated to show, and how much to science, and what relative proportions of importance are assignable to the aquarium, pure and simple, on the one hand, and what to the public and amateur promenade on the other. In whatever way the question be determined, the architecture of these buildings—if such a term can be applied to them—loses none of its interest; because nothing can be thrown away which contributes to the perfection of the structure, in whatever light



it may be viewed. Aquaria may become, before long, hardly less common than green-houses, and, in their construction, the usual blunders will probably have to be repeated and corrected in the light of the usual experience.

## THRUST OF ARCHES AND VAULTS.—II.

HAVING, in a previous article, shown how an arch may be expected to give way when improperly loaded, or when the abutments are of insufficient strength, we now proceed to explain in detail the method of calculating the amount of thrust produced by an arch, and the requisite thickness to be given to the supports. The method we shall adopt is applicable to any form of arch, but we shall confine our attention to those most commonly used by architects, namely, the semicircular and the lancet arch.

Let Fig. 4 represent the half section of a loaded semicircular arch, the depth of whose voussoirs are one-twentieth of the span, and C I the height of the surcharge above the crown of the arch; let F represent the horizontal thrust at the crown arising from the pressure of the other half arch. Assuming that fracture is about to take place

by the opening of the key-joint C M at M, and of the joint of rupture E J at E (O E J making  $30^\circ$  with O A), the force F will act at the point C, and will have a moment about the point E which is balanced by the moment of the weight W of the mass H J E M I, acting at its centre of gravity G. In order to find the value of this moment we must ascertain the position of G, which can only be done exactly by help of the integral calculus. We can, however, approximate with sufficient accuracy by the simple process of drawing the chord J C, and considering the centre of gravity of the trapezium H J C I as corresponding with that of the figure H J E M I. Draw H C so as to divide the figure into two triangles, and let  $g$  and  $g'$  be their centres of gravity, found by drawing a line from H to the centre of I C, and from C to the centre of H J, and measuring one-third of their length from the bases along those lines; join  $g g'$ , take C r equal to H J, and draw r p, making any angle with C r, and equal in length to  $g g'$ ; join I p, and draw C q parallel to I p; take  $g G$  equal to  $p g$ , and G is the required centre of gravity of the trapezium H J C I; in other words,  $g G$  is to  $G g'$  in the proportion of I C to H J, or in that of the two triangles having  $g$  and  $g'$  for their centres of gravity.

Since the weight W of the whole mass of the semi-arch and its surcharge acts at G in a vertical direction as  $G h$ , the moment of W about E will be  $W \times E h$ , which will be in equilibrium with the moment of F about E, or  $F \times C m$ , when fracture is about to ensue; that is—

$$F \times C m = W \times E h$$

$$\therefore F = W \times \frac{E h}{C m}$$

Since F and W balance about E, we can now suppose them to act at that point in their original directions, F acting horizontally in E N, and W vertically in E n. There is also another force tending to prevent the overthrow of the structure—namely, the weight of the pier and the part of the surcharge above it, or the mass L H J A R K, which we will call Q. Let the vertical from the centre of gravity of Q cut K R at S; then we can find

the thickness of K R by equating the moments of W at E and Q at S, taken about K, with the moment of F at E, also taken about the same point. The equation is therefore—

$$F \times N K = W \times E N + Q \times K S.$$

The position of S may generally be taken as half-way between K and R without material error, or if  $K R = t$ , then  $K S = \frac{1}{2} t$ . If we suppose the arch and surcharge to be built of similar material, and of equal specific gravity throughout, we need not trouble ourselves about the breadth of the soffit, or actual weight per cubic foot, but merely take the areas of the several portions to represent the weights, and the lengths of the lever arms E h and C m can be measured by a scale, their relative magnitudes only being required in order to determine the value of the force F. By means of this simple formula we have calculated the thickness of pier necessary to sustain the semicircular arches of various spaces for different altitudes of the pier, the depth of the voussoirs in all cases being one-twentieth of the span, and the height C I of the surcharge one-fourth of the span; the following are the results obtained, from which the thrust of other arches can be inferred.

1. Let the span be 20ft., and the altitude R A of the pier from ground to springing of arch 10ft., then the least thickness of the pier to produce equilibrium must be  $4\frac{1}{2}$ ft. If the pier is 15ft. high, its thickness must be  $5\frac{1}{2}$ ft., and where it is 20ft. high its thickness must be 6ft.

2. Let the span of the arch be 30ft., and the altitude R A of the abutment 15ft.; then  $t$  must be at least  $6\frac{1}{2}$ ft. If the height is 20ft., the value of  $t$  must be  $8\frac{1}{2}$ ft.; and if the height is 30ft., the thickness of the pier must be 10ft.

3. Semicircular arch of 40ft. span. If R A is 20ft., then  $t$  must be 8ft.; if R A is 30ft.,  $t$  must be  $9\frac{1}{2}$ ft.; and if R A is 40ft., then  $t$  must be 10ft.

4. Arch of 50ft. span. For a 25ft. height of pier its thickness R K must be 10ft.; if the height is 40ft., R K must be  $12\frac{1}{2}$ ft.; and if it is 50ft. high, its thickness must be  $13\frac{1}{2}$ ft.

It must be borne in mind that the thickness of pier here given will only just produce equilibrium, and its actual strength ought to be half as much more, in order to produce a firm structure, or one in which fracture cannot commence.

In the case of an arch whose contour is a segment of a circle, and the angle which the skewback, or joint at the springing, makes with the horizontal is  $30^\circ$  or more, the forces F and W may be taken as acting at the springing of the arch, that being the joint of rupture; the same method of obtaining the requisite strength of the pier can then be followed as given above for the semicircular arch.

If the size of the structure is altered, but its relative proportions are kept the same, the weight W will vary as the square of the span, consequently F, the horizontal force, must also vary in the same ratio. Hence it appears that the horizontal thrust of an arch of 40ft. span is four times that of one which is 20ft. span, provided the form is the same, and the proportion between the height of the surcharge and the span is unaltered. This is

an important point to be considered when the thrust of two arches of different span are made to balance each other.

The lancet arch requires a somewhat different treatment to the one we have been considering, since the mode of fracture will be different, as explained in the former article. The key-joint C M (Fig. 5) opening upwards at M, in consequence of the haunches being pressed in by the load. The joint of rupture is found by measuring a vertical height J n from the springing line equal to D, one-fourth of the span of the arch; and this joint opens inwards at J, so that the moments of the forces F and W have to be taken about E on the extrados. Draw the chord E M, and consider, as before, the trapezium H E M I as representing the mass W of the arch and its surcharge above the joint E J. Find the centre of gravity G in the manner described for the semicircular arch, and drop the vertical G h on E m. Then just before rupture takes place, we have the moments of F and W balancing about the point E, or,

$$F \times C m = W \times E h, \therefore F = W \times \frac{E h}{C m}.$$

We can now suppose F and W to act at E, the one horizontally and the other vertically. We have also the weight or area Q of the pier and surcharge L H R K acting vertically through its centre of gravity, a perpendicular from which cuts the base at S, K S being nearly  $\frac{1}{2}$  K R or  $\frac{1}{2} t$ . Therefore, we have to find the value of  $t$  from the equation,

$$F \times N K = W \times N E + Q \times K S.$$

If W is taken as the area of the mass H E M J, then Q will be that of the mass L H R K. As before remarked, this gives the value of  $t$  or K R, which will just produce equilibrium, and the actual thickness of the pier in order to ensure stability must be at least one-half more.

The ribs of Gothic vaulting which form the ceiling of so many old cathedrals differ from the ordinary arch in not having a load or surcharge to carry beyond their own weight, and that of a light panelling or filling-in between them. There is usually a certain amount of backing with rubble to about half the height, so as to prevent the ribs from breaking outwards. Let

Fig. 6 represent a rib of this kind, the joint of rupture E J being determined as before by taking J n equal to one-fourth the span. We have now to find the centre of gravity of the arch E J C D, which will be very nearly that of the curved line a b drawn through its centre, which is found by the formula,

$$Q G = \frac{\text{chord } a b \times \text{radius } Q a}{\text{arc } a b}$$

In the equilateral arch this will be,

$$Q G = 1.3 \times \text{chord } a b$$

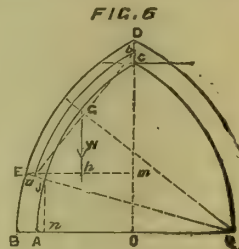
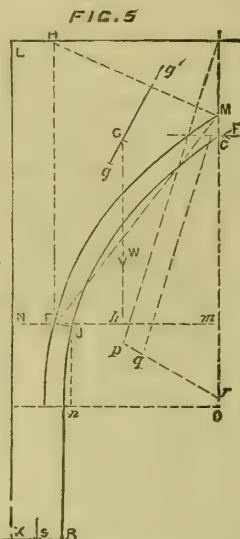
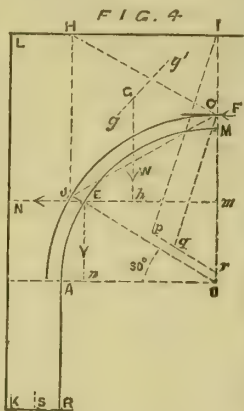
Having thus determined G the centre of gravity of the arch above E J, drop the perpendicular G h on E m. To find the weight W of the arch E C, we multiply its area by the width of the rib; the area is very nearly equal to the length of the arc a b multiplied by the depth E J, which in this case is  $.768 \times \text{radius } Q a \times E J v$ .

Having thus determined the value of W, we have, as before, to find F from the equation—

$$F = W \times \frac{E h}{E m}$$

which is the horizontal thrust at the point E when rupture is about to take place.

The thrust of diagonal ribs which have their axes inclined to the supporting wall can be determined in the same way; but only the resolved part perpendicular to the wall must be taken, by multiplying the thrust as deter-





mined above by the *sine* of the angle its direction makes with the wall; for an angle of  $30^\circ$  this *sine* is  $\frac{1}{2}$ , or the thrust directly upon the wall is half that of a rib having the same span if placed at right angles to the wall. When the angle is  $45^\circ$  the *sine* is  $\frac{\sqrt{2}}{2}$ , so that the thrust is seven-tenths of that of a rib placed at right angles and having the same span. Since, however, the span of these diagonal ribs increases inversely as the *sine* of the angle above-named, and their thrust increases as the *square* of their span, it follows that the thrust of a diagonal rib placed at  $30^\circ$  with the wall is double that of the main rib which spans the opening at right angles to the wall; and that of a rib making  $45^\circ$  will be to the thrust of the main rib as 10 to 7. Having obtained the value of the horizontal thrusts of all the ribs meeting in one point, we can calculate the necessary strength of the wall in the same way as we determined it for the arch.

We will now give a brief outline of the method of ascertaining the stability of an arch by drawing the *curve of pressures*, which has been described at considerable length in the essay on "Vaulting" above alluded to, and is occasionally useful for determining whether the voussoirs are of sufficient depth to insure stability.

Let E J (Fig. 7) represent the *joint of rupture* of an arch; CM the key-joint; divide the arch into any number of voussoirs, and draw vertical lines over the joints so as to divide the surcharge into corresponding blocks. Let P be the weight of the first voussoir, and its surcharge acting at the centre of gravity of the mass; Q that of the first and second combined, also acting at their common centre of gravity; W the weight of the half arch and its surcharge; and F the horizontal force acting on the key-joint. In order to secure stability the line of pressures must be kept within the middle half of the arch between the dotted curves, J C and E M; we may therefore suppose F to act at C, and to have a moment about E balancing the moment of W about the same point: so that the value of F is found from

$$F = W \times \frac{E h}{C m}$$

The force F meets P in the point  $\alpha$ , and by compounding these two together, we find A  $\alpha$  the direction of their resultant cutting the first joint at A. Again, F meets Q at  $\beta$ , and their resultant is in the line B  $\beta$  meeting the second joint at B; also, F meets W at  $\epsilon$ , and their resultant cuts E J at E; the points A, B, E are on the *curve of pressures*, and by taking a larger number of voussoirs we can find as many points as we please on this "curve." Should the resultant of F and W cut E J nearer the intrados than the point E, there will be danger of the arch being destroyed from the fracture of the stone.

Those of our readers who are desirous of studying the subject more deeply will find every point thoroughly discussed in Captain Woodbury's "Treatise on the Arch," written by an Engineer officer of the United States army; also more briefly in Fenwick's "Mechanics of Construction," and Tarn's "Science of Building."

The repairs to the south aisle of St. Luke's Church, Wellingborough, are finished, and this part of the building was reopened for worship on Sunday week. The painted panels of the chantry chapel will be replaced.

## THE BEAUTIFUL IN ART.

### THEORIES OF BEAUTY.—I.

WHAT constitutes Beauty has been a ripe question among philosophers of every age, from Socrates to the present time. It will not be uninteresting to glance at some of these opinions concerning it. Like all similar speculations of philosophy, it will be seen that the earliest notions were based on some abstraction of the mind. A search after some common property applicable to all things has been the mistaken goal of some speculators on the subject; while another class makes Beauty depend on a distinct internal sense or perception; and another again, on pleasing associations. Agreeable to the grouping of all speculative thought under the Subjective and Objective methods, we shall find the earlier discussion of this subject drew the explanation of Beauty from the suggestions of consciousness identifying the external with the internal order.

Socrates holds that the Beautiful and the Good or Useful are the same (see "Memorabilia" III.), while Plato, in accordance with his ideal theory, discusses beauty as something conceivable only by reason, *ideal* and pre-existing. He disputed the theory of Socrates, that the Suitable or Becoming constitutes Beauty, as these only make things appear beautiful, and not make them such. He objected also to the Good and Beautiful being thought as cause and effect, and therefore different things. Mr. Grote remarks the Greek  $\tau\omicron\ \kappa\alpha\lambda\omicron\nu$  includes, in addition to ordinary meanings of Beauty, the *fine*, the *honourable*, and *exalted*. In the "Republic" (Book VII.) he says the heavenly bodies are the most beautiful of all visible bodies, approximating most nearly to the *ideal* figures and movements of genuine and self-existent forms—quickness, slowness, number, figure, &c., as they are in themselves not visible to eye, but conceivable only by reason.

Aristotle alludes to Beauty in connection with poetry. Beauty of animals and other objects composed of parts involves *orderly arrangement* and a certain *magnitude*. Hence an animal may be too small to be beautiful, or too large when it cannot be surveyed as a whole.

S. Augustine wrote a Treatise on Beauty, now lost. He laid great stress on *unity*, or the relation of parts of a work to the whole. Shaftesbury combines the Beautiful and Good in one lofty conception, and a certain moral sense is assumed as perceiving both alike. Addison, in his celebrated "Pleasures of the Imagination," resolves the aesthetic effects into Beauty, Sublimity, and Novelty; but no analysis is attempted. Hutcheson maintained a distinct internal sense for the perception of beauty, but, at the same time, speaks of the combination of *variety* and *uniformity* as necessary to a sense of beauty; but does not make the inference, says Bain in his "Mental and Moral Science," that the sense is therefore one of variety and uniformity.

Diderot says, also vaguely, it consists in the "perception of relations."

Père Buffier identifies beauty with the commonest type or form. "Beauty, while itself rare, is the model to which the greater number conform. Handsome people have a greater family likeness than ugly people." Again: "A monster has least in common, and beauty has most in common, with the human figure." The most common is the true proportion of parts.

Coming to Sir Joshua Reynolds, he holds, like Buffier, that beauty is above "all singular forms, local customs, particularities of every kind." He says the distinct forms of beauty in some species are each representative, not of individuals, but of a class. Thus, he explains, the forms of Hercules, the Gladiator, and the Apollo are the central ideas or forms of their classes, and not any one gives the ideal beauty of the species—man. "Perfect

beauty in any species must combine all the characters which are beautiful in that species."

This is certainly a reasonable conclusion, although it does not exactly define what this central type consists in. Anyhow, we may be allowed to digress here, and say Sir Joshua's view of beauty completely places the works of our ultra-Gothicists, and a number of our modern abnormal art attempts, in the rank of the non-beautiful. But let us proceed. Hogarth, in his celebrated "Analysis of Beauty," defines certain elements as entering into beautiful compositions: (1) Fitness of parts; (2) Variety; (3) Uniformity, or Symmetry; (4) Simplicity; (5) Intricacy; (6) Magnitude. Hogarth, on the elements of variety and intricacy, founded his well-known "line of beauty," or wave line, in which the eye is led "a wanton kind of chase." All these elements may profitably be discussed, but we will leave them for the present. It must be admitted these elements contain an approximation to those qualities we deem beautiful, although Alison has denied their existence as intrinsic and independent principles.

Burke, in his "Essay on the Sublime and Beautiful," finds beauty in certain distinct properties, such as "smoothness," sweetness, delicacy, &c., or some quality which produces "an agreeable relaxation of the fibres." This remarkable analogy of the senses leads Burke to assert that he cannot recollect anything beautiful but what is *smooth*. Professor Bain shows the onesidedness of this view—viz., that this quality is merely one element of beauty in certain circumstances. Again, Burke says no natural object that is angular is also beautiful. It has been well remarked by Price and Dugald Stewart that Burke's principles are applicable to female beauty, and the softer and more feminine features, or such as induce in us a "sense of tenderness and affection." Burke evidently looks at only one condition, one species of beauty, as under some conditions smoothness would not be pleasing.

We now come to a class of writers who assert that the effect of beauty is not dependent on sense merely, but that it is a complex emotion, and involves associations or trains of thought analogous to it. Such are Alison, Jeffrey, Dugald Stewart, and some other writers, who deny any intrinsic element or cause of the beautiful.

There is something very plausible in this theory, and as it is one upon which a large modern school of art rests, we will consider it a little fully. Alison's celebrated treatise on "Taste," published in 1790, opened the way, and the appearance of this doctrine, at a time when art began to draw its inspirations from associations of Classical literature, and the more romantic spirit of the Middle Ages, may be regarded as important to bear in mind. Alison endeavours to show that the effect of beauty or sublimity springs from a complex emotion, involving (1) the production of a simple emotion or moral affection, and (2) an exercise of the imagination. He asserts there can be no aesthetic feeling without awakening a train of association, which increases the exercise of the imagination; while incompatible feelings obstruct the emotion of beauty. Picturesqueness operates in a similar manner. He means, in fact, we cannot be awakened to beauty if the mind is preoccupied incompatibly, or that the possibility of imagination is the possibility of feeling. He further says, the great mass of our ideas excite no emotion, while ideas of beauty excite some affection or emotion, as tenderness, melancholy, power, majesty, &c. As Bain clearly points out, Alison's illustrations only confirm the important fact that the imagination involves as a part of its nature the predominance of some emotion; but let us turn to some of the illustrations which Alison adduces in support of his view.

The material world is brought under review. Matter, as perceived by senses, is unfit to



produce any emotion. Thus the smell of a rose is said to produce no agreeable emotion, but a sensation merely; but these sensible qualities may form associations with emotions or affections, and become signs for suggesting these to the mind. The author enumerates some associations so formed—as (1) signs of useful qualities, as a ship suggests pleasure or utility; (2) marks of design suggest corresponding emotions; (3) appearance, as countenances, and (4) those suggestive of qualities, as we speak of the strength of the oak, and the modesty of the violet.

As regards form, he denies any intrinsic pleasure. He says architecture is the sublimest of mechanical arts, from the strength and durability of its productions, the most sublime result being the Gothic castle. The author enters minutely into the expressive qualities of lines and forms, which may be regarded as the language of architecture, and as such deserve study. Thus Magnitude is generally referable to strength; Height expresses magnanimity; Depth, danger; Length, vastness; Breadth, stability. Again, *Angular* lines indicate hardness, strength; *Winding* or curved lines express infancy, delicacy, ease, as a winding river.

Our author, in treating of complex forms, observes they must have some general character (harmony is meant), and this rule is applied to landscape-gardening, complex colours, and those works which exhibit design or fitness, but with an indiscriminate application to the useful and fine arts, it must be confessed. Speaking of beautiful compositions, he says they include both uniformity and variety as particular signs of qualities. Fitness a source of beauty, as it conveys adaptation of means to ends. *Proportion* is explained by reference to *fitness*, and under this is discussed the orders of architecture. The beauty of architectural proportion may be summed up under these heads:—(1) Expression of fitness of support; (2) expression of fitness to character of apartment; (3) fitness for particular purpose of building. Utility also contributes to beauty as attainment to useful ends. As to the principle of proportion in the human figure, he denies it, and rests beauty, first, upon its *fitness* as a machine, and, second, its *expression* of mind and character. In short, beauty or sublimity of appearances in the material world is to be ascribed to the signs of those qualities of mind they express.

We have not space in this article to review the opinions of other writers, but will allude to them and to the writings of Ruskin and Professor Bain in our next.

#### COLOUR.—IV.

##### APPLICATION TO ART.

HAVING in previous articles laid down the principles which should guide the artist in the choice, assortment, combination, and contrast of colours, we will here briefly discuss the application of those principles to decorative purposes. There are two principal modes of employing colour in decoration, viz., one by *flat*-tints, in which the colour is laid on uniformly; and the other in *relief*, or by *chiaro-scuro*, and we find decorators more or less wedded to one or the other of these modes of decoration. We may distinguish them further as the Conventional and Naturalistic modes.

We cannot do better here than confine our remarks to the employment of colour in flat-tints as that most usefully followed in architectural decorations. It is to be noticed that artists and decorators split upon this rock as much as architects do upon the subject of style. We will not discuss this *vetusta questio* now, but simply lay down certain principles.

The system of flat-tints is applicable especially to the following cases:—

1. To all decoration where colour is used as an accessory; as in architectural works.

2. To all distant objects where the finish or relief of a picture would not appear.

3. All large surfaces and backgrounds.

4. Where simplicity of outline or architectural composition is the paramount consideration.

Now it will readily appear from these principles that a shaded panel or wall paper is objectionable; it is a contravention and a blunder; it is a glaring contradiction in itself, and becomes, or aims to become, a picture. Now we contend if a picture becomes the ideal object, it is not legitimate decoration; and as the picture becomes the greater object of interest, so does the interest of architecture diminish. Or, in other words, in proportion as we make decoration pictorial, so we lose its decorative character and object. This principle should be ever borne in mind, for it is one we perceive that lies deeper than anything else at the root of correct decoration and polychromy. The employment of colours for flat-tinting, in obedience to the principles already laid down, should be regulated by certain conditions, as intensity of light admitted or thrown upon the colours, and this is all the more necessary, as the colours are neither shaded, blended, nor subdued, by shadow and other means. Such colouring, then, should observe, first, the laws of linear perspective, and, secondly, those depending on them, namely, *gradation of scale*. According to these laws, the positive or vivid colours should be placed upon the smaller and nearest parts of a building to the eye, and the secondary paler and grey colours in the larger and more distant portions. In accordance with this view, Owen Jones lays down in his rules of colouring that to assist in the development of form and to separate parts of objects, as also to assist light and shade, the primary colours are best used on "small surfaces and in small quantities, balanced and supported by the secondary and tertiary colours on the larger masses." Thus the less brilliant tones are compensated by their greater volume, and the more vivid by their smaller volume; and this law we shall observe prevails throughout Nature in the exquisite gradations of colour and tone seen in the spreading landscape and in the smaller organisms of the material world. How far decorators have observed it in the polychromy of interiors is well worthy their attention. This principle of gradation, or balance of colour, is one which may in many respects be compared to music. The most striking melodies please the vulgar ear more than those in which the sounds are less distinctively heard, or in which the inflexions of sound are more nicely modulated. A bright, vividly-coloured picture or interior, and a sprightly air, both please the ignorant and uncultivated, and both by addressing themselves to the more sensuous capacities of the eye and ear. Gradations of colour and form, and modulations in music, are both species of effect which the colourist and musician last learn, because they address themselves to our mental and discriminative faculties. It has been observed that the primary colours are the delight only of the savage and uncultivated, and it is a well-known fact that decoration has preceded dress, the tattooing of the savage having invariably marked the earliest state of mankind. Humboldt alludes to the Orinoco Indian who, regardless of comfort, will bespatter himself with coloured pigments. All primitive tribes have shown this love for bright patterns, coloured beads, trinkets, and alibices; and we have not to go far to see the same gratification among children and ill-cultivated men and women. But this lack of discrimination is more seen in non-gradation and incorrect contrast, and, as Owen Jones has remarked, in the want of skill in the application of primaries. Now the works of the Egyptians, Greeks, and Moors, while showing the use of primary colours during the best periods of their art, should also that nicer feeling for blending and distributing them, which gave their art its beauty.

Let us briefly refer to the colouring of the ancients. The Egyptians employed red, yellow, blue, green, and white on their monuments; and Lancret observes "that if at first sight the colours appear arbitrarily disposed, it is because the colours have not been sufficiently studied, and that this part of the arts of the Egyptians was like the rest, submitted to invariable rules." Champollion the younger also speaks in high terms of the painted sculpture of the Egyptians; and the colours employed upon the hieroglyphics, sculptured symbols, and ornaments attest a ruling harmony of colour, which may be seen in the beautiful examples left us by Owen Jones.

As to Greek architecture, traces of colouring not suspected by the earlier revivers of the art have been discovered. It is now well known that tints flatly employed were used. There is good reason to doubt the existence of strong bright colours, as some suppose, though the chalky whiteness of the limestone under a brilliant atmosphere would have been almost unendurable without tints of some kind. Conjecture, however, as to the use of colour is set at rest when we find the brightly-coloured prototypes of Egypt and Assyria, which helped to fashion Greek art. The brilliant and overpowering effects of an Eastern sun, added to their immature art, made colour almost a necessity with the Egyptians and Assyrians. We hear, indeed, both in the "Iliad" and in the Book of Jeremiah, of "vermilion beams," in allusion to a royal palace.

What were the colours used by the Greeks, and how were they distributed? They were white, black, red, yellow, blue, and green; and, according to Chevreul, were placed as follows:—The principal lines, as the fillets of architrave and cornice, were red; the mutules blue, their guttae white; triglyphs blue; their channels black, and their guttae white. The more extended parts of frieze and cornice, and the architrave, were of light yellow. Thus the principal lines were of a brilliant colour, as red, the blue formed an harmonious union of the parts, and the light yellow, dominated because more agreeable than if either an intense or subdued colour prevailed. There appears to be some doubt as to the exact distribution of colour on the different parts, but sufficient evidence is found to establish the rule that the brighter positive colours were employed to accentuate lines and details, and that these were blended or united with a subdued tint or a less vivid colour on the larger surfaces.

#### HOSPITAL CONSTRUCTION.—III.

##### GENERAL ARRANGEMENT.

REFERRING to the block plan we gave last week, showing the general arrangement of the Herbert Hospital, it will be observed that the administrative offices are located in a distinct block, quite separated from the Hospital itself, and only communicating with the latter by passages. The kitchen in this case is in the basement, quite separated; above the kitchen is the library; and the upper floor forms the chapel. The corridor seen in the plan is the only connecting link of the several pavilions. Now the communication between the kitchen and the Hospital wards is by the basement corridor, under that shown in our outline plan, and is at once direct. Thus the diets, or cooked dishes, are simply taken from the kitchen to the lifts, which convey them to the required floor; and hence the only connection between the kitchen and the hospital wards is by these lifts. In the construction of this hospital we have some desirable points:—(1) Facility of communication; (2) perfect isolation of pavilions; (3) separate administrative departments, and ready means of delivery; and these points lie at the foundation of a good hospital plan.



There is another point to be noticed before we leave this plan. Separate accommodation is provided for special cases and for operation cases. This is desirable, though we generally find no separate provision allowed—these wards being placed on the same floor and under the same roof as the ordinary wards. Dr. Sutherland and Captain Galton recommend one or more single-story pavilions, as is the case in the Herbert Hospital; and, by referring to our outline plan, our readers will see the arrangement in that case on the left hand side of the plan, forming the end of corridor. This is on the ground floor, and is intended for lunatic cases which require to be under the eyes of attendants. The corridor continues through these extra wards, and is lighted and ventilated from the roof. It is recommended this corridor should be, for special wards, 12ft. wide, and should have a window at the end, with the ward sinks, water-closets, &c., placed on either side, like the other wards. The nurses' rooms and scullery should be located at the other end, or entrance to corridor. Ample roof-lighting is necessary, and the warming and ventilation should also be thought of. The wards themselves are recommended to be separately warmed and ventilated; the doors, also, should have plate-glass panels, so as to allow the attendant to observe, without opening, the demeanour of the inmates.

As regards the laundry and boiler-house, they should be quite detached, and at a sufficient distance from the building, and not in the basement, as sometimes seen. The boilers and engine-house should have a separate building, with its own ventilation. The kitchen and its offices, as we have shown, should be a separate pavilion; and over it might be placed the chapel. Surgery, physicians' rooms, dispensary, and other requirements for the officials, nurses, &c., may be also separately treated, though nurses should have their own apartments, away from the contaminated atmosphere of the sick-wards, in a separate block.

Other instances of the connection between the hospital proper and the administrative department may be noticed. In the Lariboisière Hospital, Paris, the general block plan is of quadrangular shape, enclosing a central courtyard. There are three pavilions or blocks on each side, the two other sides being the administration—the sisters' quarters, chapel, baths, laundry, &c., occupying one side, and the kitchen, medical officers' rooms, dispensary, and other offices being placed in the other side. The detached pavilions contain 612 beds; those at the Herbert Hospital 650 beds. In the last case the staircase is in the centre of the building, close to the library, between the administrative and ward corridors, a second staircase being at one end. Our block plan last week was to a scale of about 400 feet to the inch. The Netley Hospital, on the banks of the Southampton water, not far from the ivy-mantled ruins of the well known abbey, is probably one of the largest, as it is one of our latest-built, hospitals. This building is upwards of a quarter of a mile in length, and is situated on a slope of light, gravelly soil, about 300 yards from the water's edge. The building runs north and south, and consists of a centre and two wings, each of these stories about 600 feet long and 70 high. The centre is of four stories, and is about 216 feet wide, and is devoted to the officers' apartments, the surgical and medical staff; it also contains a swimming bath for the use of the inmates, sulphur and acid baths, and a library 57 feet by 34 feet and 15 feet high.

The wings contain the convalescents, and with the other wards accommodate 1,000 convalescents. Each floor of each wing contains twelve wards, ten for the accommodation of nine patients each. These are each 36 feet long by 24 feet wide, and 15 feet high; the other two for sixteen men, are 48 feet long and 34 feet wide. Each of these three floors, of both wings, have therefore twenty-four wards. On the floors of each wing are several baths and lavatories.

The kitchen and offices are placed in the rear, quite detached, and communicating by covered passages. Two dining-rooms, each 60 feet long by 32 feet wide, intended for the assemblage of all the inmates who are able to join, are over the kitchen, an improvement on the old system, where each man partook of his meals in the wards surrounded by the sick. The chapel, forming the centre portion, is 100 feet long and 63 feet wide, and 50 feet high, and is detached, except by a covered corridor, from the main building.

Ten separate wards of two stories, each 40 feet by 24 feet, are detached in the rear, and occupied by convalescent officers; and others for men with cutaneous, feverish, or ophthalmic disorders, which need separation. Orderly, store, *post-mortem*, and other offices, also form a separate rear building.

The means of communication between the principal wards is by an arcaded corridor, 12 feet wide and 15 feet high, which runs along each floor or building from end to end. The arcaded openings are glazed, and form in fact the façade of the wings towards the water. These openings, or windows, are 4 feet wide by 8 feet high, and light and ventilate the wards which open into the corridor.

The wrought-iron hollow girders form ventilating tubes, their ends being open to the external air. From these hollow girders pipes lead to the floor levels of the wards and corridors, giving the air ingress through the perforated gratings above the skirtings. The floors of corridors, &c., are arched, and ventilators in the ceilings carry off the vitiated air to the main extraction flue. Though, perhaps, not the most desirable model for a hospital, the arrangements are pretty complete; and the design, which is in the Italian style, simply depends for its effect upon a happy distribution of mass, and the arcaded corridor fronts, which, with a well proportioned open stone coupled columned centre, crowned by a cupola, gives a dignity to the composition. Red brick and Portland stone dressings are used.

In our next we will illustrate a few other examples of general arrangement, and enter upon the detailed arrangements of hospital wards.

#### BOARD-SCHOOL BUILDING IN SHEFFIELD.\*

SHEFFIELD has not been behind in the erection of public elementary schools. Fourteen new schools appear to have been built since the Elementary School Act has been passed, and the architects have judiciously published the result of their labours in a handsomely-illustrated folio. The object the authors had was to "place in the hands of the members of the Board" views and plans, accompanied by particulars of the cost, accommodation, &c., of these schools, and we think the work will be found a useful addition to the extant information on the subject. The illustrations, which form the bulk of the work, are photolithographs by Whiteman and Bass, and are well executed—though if some of the plans had been a little larger it would have added to the usefulness of the book. This might have been done at the expense of the views without sacrifice.

The descriptions are short, but sufficient, and two useful tabulated summaries are added, giving the numbers of the boys, girls, and infants accommodated, the area of square feet allowed in each case, cost of site, contract amount for buildings and fittings, area of site, and cubical contents of rooms. From these summaries we gather that in the fourteen schools 10,136 have been provided for, or 3,176 boys, 3,161 girls, and 3,799 infants; total area of square feet being 103,336. Again, the total cost of the buildings, sites, fittings, &c., has been £94,339; area of site 30,090 square yards. One of the largest, and the costliest, is Springfield School, the illustration of which appeared in the BUILDING NEWS

\* "Illustrations of Public Elementary Schools erected for the Sheffield School-Board." INNOCENT & BROWN, architects, Sheffield.

(p. 554 of our last volume), to which we refer our readers.

The calculations of accommodation were based on the requirements of the Education Department, or the average allowance of 10-194 superficial feet per scholar in school and classrooms combined, the infants having 8ft. and the boys and girls 11-423ft. The heights of the rooms give an average of 165 cubic feet per child. Referring again to the cost, it appears that, including buildings, boundary walls, asphaltum of yards, water supply, fittings, and furniture, the average cost per head throughout is £7. 14s. 6d., which compares favourably with other Board-schools.

Let us briefly refer to the details of construction noticed. Side-light is provided in all cases, we are told, in the classrooms and galleries. The classrooms open out of the schoolroom, so that the principal teacher can supervise the whole, and the doors between have upper glazed panels. The infants are placed on the ground-floor level, and their galleries are recessed, leaving ample space for marching. Separate entrances, yards, and offices are provided for every school, beside spacious covered playsheds. Staircases are in short flights of stone, and their ends rest on solid walls. The seats are dual, backed, and are those patented by Mr. Moss, clerk to the Board.

Contrary to some opinions on the subject, the warming is by hot water, on the high-pressure system, known as Perkin's, the pipes passing along the skirtings; the furnace being in basement. Classrooms, managers' rooms, and kitchens have fireplaces. We are not told how the ventilation is managed, except that there is an arrangement of inlet-grates in the floors direct from external air and outlets to extracting flues, both being under control of teacher. Upper hinged casements are also provided.

Viewing the designs as a whole, a careful study of plan as regards site is observed, and the architectural treatment is free and generally suitable. There is a tinge of quaintness in the Gothic adopted, and we are inclined to think the first designs are somewhat freer of this. Some of the treatments of windows show a little too redundant effect to obtain piquancy and variety, and the filling-in under some of the inclosing window arches is a trifle overdone in some instances. We think the Newhall, Broomhill, Netherthorpe, Philadelphia, Grimesthorpe, Lowfield, Crookes-moor, and Springfield schools are about the best examples in this respect, though generally the designs show thoughtful and well-worked-out plans. The chimney stacks are usefully employed as extraction shafts, and in several cases they are set diagonally with the louvred outlet between. Altogether, the book gives a useful collection of the embodied results of the new school régime, and we cordially recommend it.

Five of these schools were formally opened on Tuesday, viz., the Walkley school, the Crookesmoor school, the Lowfield school, the Attercliffe, and the Carbrook schools.

The planning of these schools, though varying to meet the different sites, is based strictly upon the principles required by the Education Department, and the description of the construction and details already given applies to all of them.

In the Walkley school the ground-plan somewhat resembles the letter T, the schoolroom being 54ft. long and 41ft. wide at the widest part, with two classrooms and manager's room. A kitchen, fitted up with cooking range, is provided in the girls' division, and lavatories and cloakrooms for the three divisions of the school. The boys and girls on the upper floor have each a schoolroom and three classrooms opening out of it. Ventilation is by inlets at the floors directly supplied from outer air, and outlets to extracting flues and chambers, both under control of teacher, and which are said to answer well. The upper part of windows are hung as casements, opening by cords and pulleys. Stairs are all of stone, and rest on



solid walls. All the rooms and passages are lined with boarding up to eills, above that they are plastered and tinted. The ceilings are plastered and have cornice mouldings; the roof of upper story has its timbers exposed and varnished. The woodwork is of varnished pitch pine except the capping to wainscoting, which is oak. Covered playsheds are provided. The walls are built of stone. The area of site is 2,400 yards, and the cost of it, including purchases, was £900. Contracts for building and fittings amount to £5,600. Accommodation is provided for 709 scholars. The contractors are—for the masonry, Mr. J. Rodley; joinery, Mr. J. Spink; slating, Messrs. Ellis and Wetherill; plastering, Mr. A. Berrisford; plumbing, Mr. Walker; painting, Mr. Hepworth. The desks are, as before remarked, on the dual plan of Mr. Moss, clerk to the Board. The fittings were manufactured by Messrs. Braun and Downing, of Birmingham, from the architect's designs. The stoves are those of Messrs. Longden and Co.; the high-pressure warming apparatus for large rooms is by Mr. R. R. Gibbs, of Liverpool. Mr. Harry Hems, of Exeter, did the carving. The whole work has been executed from the designs of the architect.

The Crookesmoor School, facing Oxford-street, is, like the others, of stone, and of the same general construction. Two gables in the centre of the front with traceried windows, filled with geometric glazing, are prominent features. The chimneys serve as extraction shafts, and their appearance is heightened by the use of red Berkshire ridge-tiles and finials. The same division and general arrangements, as in the former school described, is followed. The same tradesmen have been employed in the fittings; Mr. Dowling having done the masonry; Mr. Robertson the joiners' work. Mr. W. Dickenson is clerk of works. The various contracts amount to £6,390. Accommodation is for provided 779.

The Lowfield School differs from the others in plan, in having all the rooms upon the ground-floor; the girls and infants being in one block and the boys in a detached building. Contracts amount to £5,715. Accommodation for 705.

The Attercliffe and Carbrook Schools are generally of similar construction and detail. The stove-grates in the latter are from the designs of the architect, and combine the stove and chimney-front in one. Attercliffe accommodates 734, and cost £5,424; and Carbrook accommodates 731, and cost £5,994.

#### THE NEW "ROYAL HOTEL," BLACK-FRIARS.

A STately BUILDING in course of erection at the junction of the Victoria-Embankment with New Bridge-street, Blackfriars, must have attracted some amount of attention. It is intended for De Keyser's hotel, and will replace the old dingy brick building now occupying part of the site. The facade, which is imposing in its length of frontage, will, when completed, form a bold curve or segment connecting the Embankment and Bridge-street frontages. On a recent occasion a special visit was made by members of the Architectural Association to this building, and we may give a few particulars here of its arrangements.

Of the exterior, although there is nothing very striking in its treatment, it may be said it commends itself for its simplicity and characteristic expression. The style adopted is of an Italian type, a French feeling pervading some portions. Mr. E. A. Grüning, the architect, has wisely, however, restrained mere exuberance or richness of detail, and has relied more on the simple architectural division of the facade, which comprises a centre (only partially finished) and two slightly emphasised wings. The centre in its upper part is recessed, and is occupied by detached Corinthian columns, which, with the lateral projections, will, when completed, form a well-balanced composition, though at present having a one-sided effect. The materials of the front are well chosen, viz., white Suffolk bricks

and Portland stone, the latter being employed for architraves, string-courses, entablature, and the pilasters and columns. No tawdry coloured mixture of red destroys the unity of the design, as is the case in some of our town buildings, while the greenish black tinge of a smoky atmosphere renders the red and yellow stock abominably distasteful. Crowning the attic story we have a mansard or pavilion roof of light-green slates, the hips and ridges and dormers being of cast ornamental zinc, executed by the Vieille Montagne Zinc Co.

Access to the portion now finished is through a segmental arched gateway 22ft. wide, forming the basement of one wing of the centre. The remaining frontage of the finished western block is occupied by shops independent of the hotel, and are of fireproof construction. Light, open, spandrel ornamental iron fronts divide this series of shops, the cast-iron columns being placed in front of the iron stanchions supporting the wrought girder and superstructure under every pier. The ironwork of these fronts is the work of Mr. Cooper, of Drury-lane, and the revolving iron shutters are by Messrs. Bunnett. The arched iron fronts in narrow bays will take off the weak and unsupported appearance which such a length of superimposed facade would necessarily have if treated in the ordinary manner. When this block is completed, the old hotel, extending from Chatham-place to William-street, will be taken down, the business being transferred to the new part; and the completion of the new hotel will be resumed by the extension of an eastern wing to William-street, thus greatly widening this important junction of the Embankment, and easing the flow of traffic from Queen Victoria to New Bridge-streets. The whole frontage will then be about 600ft. The eastern wing, on ground-floor, will also be let as shops and offices for the present, till the rapidly-increasing hotel business of M. De Keyser demands its space.

The gateway before described leads into a central courtyard about 63ft. square, paved with Barnett's asphalt. In the centre is a circular skylight for lighting an underground billiard-room, which provides six tables. Surrounding this courtyard, right and left of entrance, are the various offices, reception-rooms, &c., one side being the dining-room, 110ft. by 36ft., and 28ft. high, and accommodating 300 persons at *table-d'hôte*. The windows are in two tiers; the top-lights are placed in a well-designed groined cove. The ceiling is effective, and is divided into compartments by plain soffits or bands, the centre one slightly domed, with a ventilating gas-burner. The coved cornice is broken into bays by the upper range of lights. There is a gallery at each end of room. The principal staircase, fronting the entrance porch, is of stone, 7ft. wide, 11in. treads, and 5½in. risers, the ends being carried on iron stiffeners. The principal stairs are arranged in three flights, and open under a screen of coupled columns, and the iron carriages are encased in plaster, and deeply panelled on the soffit. The lantern of this staircase is very effective. A secondary and back staircases are also provided.

The great aim has been to make each floor complete in itself. Hydraulic lifts for passengers and luggage, and separate box-lifts worked by hand-power—will form the communication between floors and kitchen, &c. Each room will be provided with an electric bell, communicating with the attendants' room provided on each floor. This system will only require waiters to each floor distinctly performing their duties without confusing those below or above.

A morning-room, 60ft. by 25ft., is on the first floor, having communication with kitchen by a special lift. The other portion of this floor along the Embankment is devoted to sitting and bed rooms, arranged *en suite* with folding doors, these being double—a point very desirable to ensure privacy. The three floors above are similarly arranged. The corridors which traverse these rooms are well lighted from court. The upper floor is utilised for the employés of the establish-

ment. Another feature of merit is the semi-peristyle placed at the junction of the two main corridors, serving as a light shaft, and extending from the top to bottom of building.

Since this block has been erected another square block of considerable dimensions, abutting upon William-street, has been erected to provide for the increasing demands of the hotel. The ground level of this back block is on a level with the basement of front block, the Embankment being 12ft. higher than the William-street level.

An open oblong area for lighting occupies the centre of this building. A large tank, as a reserve supply for water, is constructed in this area, 66ft. long, of four bricks thick in cement, lined with tiles, and capable of holding 40,000 gallons.

Separate water-cisterns, baths, and w. closets, supplied by steam-power from an artesian well, are provided for each floor. The well is being bored by Messrs. Baker Bros. Large tanks on roof, which feed the hydraulic lifts, and also to afford instant supply of water in case of fire, are judiciously provided (and no large building should be without them); standpipes and hose are attached to each floor. Messrs. Waller and Co. constructed the hydraulic lifts; the hot water and cooking apparatus is by Messrs. Benham and Sons, Messrs. Middleton and Co., of Southwark, arranging the water-supply details. About 250 bedrooms are provided in the present erection.

The carving to first-floor window heads is by Mr. Seale, of Thurlow-street, Walworth. Messrs. Lucas Bros. are the contractors, and Mr. Boase foreman of works; Mr. Charles Valentine Hunter having acted as architect-clerk of the works, under the architect, Mr. Grüning.

One other feature worth mentioning are the iron-trusses supplied by Messrs. Moreland, which carry the walls over the dining-room, and of which Mr. Moreland, in a paper published in the BUILDING NEWS, gave an interesting description some time ago. (See p. 77 of our last volume.)

#### ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS.

THE second "outing" in connection with the recently-formed Home Counties' branch of this Association took place on Wednesday week, under the guidance of Mr. Lewis Angell (engineer to the West Ham Local Board), and Mr. Ellice Clarke (Borough engineer, Ramsgate), hon. sec. for the district. There were also present Messrs. Grindle (Hertford), Clements (Tottenham), Rogers (Hornsey), Galsworthy (Aldershot), Harding (Epsom), Monson (Acton), Vallé (Stow-on-the-Wold), Pinkerton (Richmond), Burnham (High Wycombe), Dewey (Cheshunt), Parry (Reading), and Murphy, G.E., of Her Majesty's Convict Department. The *locale* selected this time was Tottenham. The members assembled at half-past eleven at the offices of the Local Board, Tottenham High Cross, whence they proceeded in four-horse drags to the sewage works of the Local Board, situate alongside the River Lea. Mr. Clements, the engineer to the Local Board, conducted the visitors over the works. The engine-house was first visited, and here a remarkably fine horizontal engine, which has just been made and erected by Messrs. Whieldon and Cooke, engineers, of Westminster-bridge-road, attracted much attention. This engine, which is of forty horse-power, actuates the pump, which makes about ten strokes per minute, raising sixty or seventy gallons per stroke, the lift being about 12ft. An ingenious little instrument called the "Pneumatic Recorder" (Whitehouse and Clarke's patent), registers the number of revolutions per minute made by the engine, so that it is always possible to tell the amount of sewage being raised by the pump. The engine has a somewhat novel arrangement of cams, which allows of the steam being cut off at any portion of the stroke. The sewage comes, black as ink, through the outfall into a small tank or reservoir on one side of the engine-house, into which tank or reservoir a continuous stream of lime and water is poured from a barrel or trough above, the lime being mixed with water by hand, the sewage-water itself being used to



mix with the lime, owing to water being scarce at Tottenham. From the tank or reservoir before-mentioned the sewage, diluted with the lime and water in the manner stated, flows through a penstock to the pump, by which it is raised to the subsiding tanks. Flare lime is used. Several of the visitors took exception to the manner in which the lime is mixed, contending that by the mode pursued at Tottenham it is no deodoriser at all, inasmuch as, not being slaked before-hand, no true hydrate of lime can be formed, and therefore, that the mixture as described was mere lime-wash. Mr. Clements, the engineer to the Local Board, admitted that the lime was not used as it should be at present, for various reasons, but that in a short time the works would be under different management, as hereafter stated. The subsiding tanks are three in number, parallel to each other, and are built of concrete. Each tank is 300ft. long and 25ft. wide, with an average depth of 7ft. 6in. When a tank is filled, the contents are allowed to subside for two days, and the water then flows off into what is known as "No. 4 tank," whence it passes into the Lea—clarified and improved certainly, but (as expressed by several of the visitors last week) still in the condition of sewage, so that it is not difficult to conceive that the River Lea is in a very polluted state. The sludge or deposit is pumped from the bottom of the tanks into large shallow pits, where it takes from six weeks to two months to become comparatively dry and consolidated, when it is mixed with lime and ashes, and used as manure, which, although given away, is not removed with any alacrity by the farmers; indeed in order to get rid of it a large quantity is now being buried. The process we have thus briefly described is the old-fashioned lime process, but the works are about to be taken over and managed by the Enfield Sewage and Chemical Manure Company (Whitbread's patent) upon the following terms: The Tottenham Local Board will do the pumping, maintain the engine, &c., and pay the Company £200 per annum (the estimated cost of lime), besides allowing the Company to dispose of the sludge, the Company on the other hand, engaging to find all the chemicals used in their process, and all labour required, and also guaranteeing to meet the requirements of the Lea Conservancy as to the effluent water. When this Company takes possession of the works, the lime will be properly slaked before using, and mixed by machinery now erecting for that purpose.

The visit to the works having been concluded, the carriages were again brought into requisition, and after a very pleasant drive the Alexandra Palace was reached. A considerable time was spent under the guidance of Mr. Martin, in examining the principal constructive features of this building, in which, although great progress has been made during the last two or three months, much remains to be done. It is not necessary here to enter into particulars as to the structure, it having been rather fully described by us on the occasion of the visit of the Civil and Mechanical Engineers' Society. The visitors having adjourned to a room adjoining the great banqueting hall, the chair was taken by the President, Mr. Lewis Angell, and

Mr. PARRY, Borough Surveyor, Reading, read the following paper on

#### STREET WATERING.

The particulars that I am about to give on the subject of street watering bear chiefly the character of a comparison between the value of two systems of laying on the water, one being by the ordinary water-cart and barrels, and the other by what I will term hand-watering. I have selected this subject merely on account of many inquiries that have been made respecting our system of hand-watering. The watering of the carriage-ways or streets is, as all town surveyors know, a work of necessity in dry seasons, and to do the work in the most efficient manner, and, at the same time, at the least cost, is a matter of some importance in all towns where the carriage-ways are principally macadamised. I will take for my present purpose, to illustrate what I am about to say, the Borough of Reading, where I am located, and in which there does not exist a paved street—I mean a paved carriage-way. In Reading, there are about twenty-three miles in length of public roads, about seventeen of which are watered, mostly twice a day; and to do this we have in use eleven water-carts and barrels, and four hand-watering machines. To give the cost and describe the utility of the two modes of watering I have prepared the following particulars:—A water-

cart will water twice a day a superficial area of 23,849 yards, and for a length watered one width that means, 5,962 lineal yards, or, for a double width, 2,981 yards, the cost per day of laying on being as follows:—Horse, cart, and man, 8s.; cost of maintenance and repair of carts, harness, shoeing &c., 1s. 5d; making 9s. 5d per day. With respect to the hand machines, we have in use one of Headly's drum machines, and three of special make somewhat similar to those used in Paris. They are both capable of doing the same amount of work, and the area of road watered by one machine is 23,740 square yards. Headly's machine cost, five years ago, when new, £31. 7s. 3d., and the repairs and maintenance since that date have cost £22, or an average of £4. 8s. per annum, and is just now almost past repair. The other description of hand machine cost each, when new, about £20, and the repairs and maintenance have amounted to an average of £3. 18s. each per year. They were in use some time before Headly's was obtained, and they will be of use for a long time yet. The cost of labour per day by the hand machines is: for two men at 2s. 10d, 5s. 8d. (as it requires two men to work the machine properly, one to distribute the water, and the other to move the machine and to attach and detach the apparatus to the hydrants); adding to this 7d per day for maintenance and repairs will make the amount 6s. 3d. per day. The quantity of water delivered by the water carts is 0.51 gallons per square yard, and by the hand machines 1.30 gallons. It will be seen, therefore, that the quantity of water laid upon the surface of the roads by the hand machines is much in excess of what is done by the water carts, and having had some years' experience of both the systems of street watering that I have described, I am satisfied that whenever watering by the hand-machines can be resorted to, the roads are much better watered, and done much cheaper than by the water-carts; and it is only in narrow streets, where the apparatus would rather obstruct the traffic, that water-carts are the most useful, and narrow streets, of course, need the least watering.

A short discussion ensued, the general opinion being that for wide thoroughfares with not too great a traffic, the system of hand-watering as advocated by Mr. Parry was the most efficient and the most economical. The present system of watering roads by means of carts and vans was generally condemned as cumbersome and exceedingly expensive, although, under certain circumstances, it was the only means at present available. Bayley's hydrostatic water-van was spoken of as being very little, if at all, superior in point of economy to the ordinary water-carts. The general conclusion arrived at was that in some system of watering from perforated pipes laid along the edges of the kerbstones, such as Brown's patent, would be found the ultimate solution of the problem.

The subject of sewer ventilation was then briefly discussed, Mr. Ellice Clark and other gentlemen stating it as their full conviction that the only proper way to ventilate sewers was to have as many openings as possible, unimpeded by charcoal or anything of the kind. Sir Joseph Bazalgette and Mr. Haywood had, many years ago, proved to a demonstration that ventilation by means of furnaces, as adopted in mines, was impossible. It was stated, however, that at Shaftesbury, a few years ago, the main sewer of the town was ventilated successfully by means of a large number of 4 in. pipes which were carried up against the houses at short distances apart, these pipes, it should be understood, not being used to carry off rain-water from the roofs, or for any other purpose, but that of ventilating the sewers.

The business of the day concluded. The members dined together at the Alexandra Palace.

#### REYKJAVIK, THE CAPITAL OF ICELAND.

A CORRESPONDENT of the *Times* gives the following particulars of Reykjavik, the capital of Iceland: Every house in the place is built in the gable style of architecture, if such manner of housebuilding deserves, indeed, such an artistic-sounding name. The shore is lined with the storehouses of the merchants. Some of these stores aspire to ascertain degree of loftiness—loftiness for Iceland, mind—and have their façades painted in various degrees of dull shades, when

not simply covered over with tar; turned seaward, with their one or two rows of small square windows, admitting light on the principle of saving, and air on the principle of resistance. The foreshore is traversed by some half-dozen 'bridges,' or piers, at which landing is effected in boats from the ships lying in the roads. As you land and enter the capital, you find that it is regularly built, along straightly laid-out streets, with open gutters on either side of the main road, directly under the windows of the houses which line the streets, the windows, in the majority of cases, being so low that you can see into and through the houses as you pass on. There are public buildings in Reykjavik, but not many; such are the college, the public library, the cathedral, the hospital, the printing press (a national property), the governor's residence, and the gaol. The most important in size is the college, a square, uninteresting building of wood, brick, and lime, already tottering to its fall in the twenty-ninth year of its existence. The cathedral, another modern building of a nondescript sort of style of architecture, stands also on the verge of its collapse, the building having been completed in the same year as that of the college. It appears the builders of these edifices were not aware that mixing salt sea-sand with the mortar must necessarily destroy them in a short time, nor that unless means were adopted for arresting the capillary attraction, the humidity ascending from the damp soil of undrained Reykjavik must necessarily accelerate the destruction at an incalculably rapid rate. The fate of these buildings seems likely to be shared very soon by the lately erected public library, a stone structure in the immediate vicinity of the college, which already has accumulated in the porous stone of which the walls are made such an amount of damp that the walls in winter grow alternately rimy and dripping according to the changes in the atmosphere from thaw to frost, or the reverse.

The Icelanders have not made much progress in church architecture, according to another correspondent, who says: "The cathedral at Reykjavik is a hideous building of brick, plastered over with stucco. In many places the stucco and brick under it have scaled off in large patches, leaving very ugly-looking raw places. In a climate like this plaster is a mistake. It cannot possibly stand the winter cold. Inside, the cathedral is simply a square chapel, with hideous galleries. Altogether, it would perhaps hold 300 people. There is a font by Thorwaldsen, who was a native of the place. Over the altar is a tawdry picture, in the worst French style, of the Resurrection. A copy of this picture is in the little wooden church of Kirkjuvogr."

#### BOOKS RECEIVED.

*Annual Report of the Board of Regents of the Smithsonian Institution, for 1872* (Washington, U.S., Government Printing Office). Besides the official record of the proceedings of the Smithsonian Institution, this volume contains a general appendix, consisting principally of reports of lectures, translations from foreign journals, and other matter of varied interest.—*A Rudimentary Treatise on Clocks and Watches, and Bells*, by Sir EDMUND BECKETT, Bart. (late E. B. DENISON, LL.D., Q.C., F.R.A.S.) (London: Lockwood and Co.) This is the sixth edition of Sir Edmund Beckett's well-known work, revised and enlarged. The appendix of the last edition is incorporated, and the chapter on Bells, especially, has been extended.—*First Lessons in Theoretical Mechanics*, by the Rev. J. F. TWISDEN, M.A. (London: Longmans, Green, and Co.). This book will be welcomed by a numerous class of readers—those who wish to study the first principles of mechanics before they have obtained the knowledge of geometry, algebra, and trigonometry which most elementary books on the subject presuppose. With the exception of chapter VI., and a few articles and examples towards the end, the book may be understood by anyone possessed of a knowledge of arithmetic, a few rules in mensuration, enough geometry to make accurate diagrams with the compasses, scale and protractor, and enough algebra to solve a simple equation.—*The Land-Improver's Pocket-book*, by JOHN EWART (London: Lockwood and Co.) is a very cheap and portable compendium of calculations required by land-agents and engineers; together with a considerable amount of information on subjects relating to the permanent improvement of landed property.



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## ILLUSTRATIONS.

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## OUR LITHOGRAPHIC ILLUSTRATIONS.

## ANCIENT HOUSE, BELLERBY.

THIS fine old mansion is situated about two miles from Leyburn, Yorkshire, and although its details are good, the general aspect is not at all captivating, nor was it improved by the addition of the curtain wall to the left of the picture—a scheme undoubtedly resorted to for the purpose of hiding the roof and making the façade look as Classical as possible—a taste which at that period was coming considerably into fashion. Judging from the wall to the left of the building, one would conclude that it originally had a corresponding wing, and that the present entrance occupied a central position. H. A. G.

## SCREEN, DECORATION, &amp;c.

We are enabled, by the courtesy of Mr. J. B. Talbert, the designer, to give a double-page illustration of his Royal Academy drawing of a scheme of decoration which is now being executed by Messrs. Jackson and Graham. Mr. Talbert, in a letter to us, says:—"The screen divides the room set apart for furniture of the class shown, and the fireplace in centre was exhibited at the Royal Institute of British Architects. The principal framing is of oak, with ebony mouldings. The oak, instead of being stained in the usual way, is treated by fumigation, so as to get a dark brown colour from the wood itself, and this is not merely on the surface, but penetrated. The cove at top is carved very flatly, the grounds being punched and picked out with a reddish colour. The decoration of walls is not yet complete, but the dado is of varnished pine, the walls of a neutral green colour, with a small stencilled diaper of yellow and red, separated by gold lines. Above this, the frieze has alternate black and gold grounded panels, with fish, fowl, fruit, &c., painted by hand. One of the panels has been very well copied by Messrs. Jeffrey and Co. It is my intention to publish my Royal Academy drawings, as a continuation of my work on Furniture."

## CHEST IN CROSCOMBE CHURCH, SOMERSET.

This church is principally of rich Perpendicular style, and contains many beautiful specimens of carved woodwork of the Jacobean period, including the roof, a screen, a pulpit, bearing date 1616, reading-desks, and benches. There are also several fine bench ends of the time of Henry VII. The chest is in an upper room, used by the vestry, at the west end of the south aisle. The room below was formerly an armoury, and retained its treasures until quite a recent period, when a Bishop of the diocese borrowed them, but forgot to return them. It was used also as an ammunition store at the time of the Civil War, and still retains its strongly grated windows.

C. P. EDWARDS.

## WORKSHOPS, THAMES DITTON.

The illustration of Messrs. Cox and Sons' workshops at Thames Ditton shows the gatehouse and the foundry and chasing-shops, designed by Mr. S. J. Nicholl, architect. The gatehouse includes the office, warehouse, and keeper's apartments; the whole of the top story being a large room, for the use of the workmen as a reading-room, or for meetings, with a separate entrance from the street. The gateway opens into a roadway 170ft. long, between two ranges of workshops, with a traveller working along the whole range, and extending from the river to the gateway. One range of buildings, 42ft. wide, and three stories in height, is occupied on the ground floor by the machinery for wood-working, and for stone,

marble, and granite cutting and polishing; the first floor by carvers, joiners, and cabinet-makers; and the second floor by metal-workers; the range on the opposite side being the mason's and stone-carver's shops. The foundry will be for bronze castings the first to be done being the colossal statue of Lord Mayo, from the model by T. Thornicroft, Esq. The roadway at this point takes a turn, leaving an irregular space at the side of the foundry, partly occupied by chasing-shops, and roofed over in the simplest form for economical reasons, as shown in the view. The area occupied by the buildings, by spaces for seasoning timber yards, &c., is about an acre and a half, with a river frontage of 280ft., and a frontage to the Summer-road to Hampton Court of 580ft., the distance being about twelve miles from Hyde Park Corner. Messrs. Cox and Sons, in removing their factory from London, consider that they offer one solution of the difficulty so felt as to workmen's dwellings. The men and their families will be able to have comfortable cottages, with gardens and open spaces, within a few minutes of their work; whilst Messrs. Cox and Sons calculate that they will effect a saving of cost by having their materials delivered by barges direct from the docks to their wharf; and against the extra cost of conveyance of finished goods to London, there will be the saving on the value of the site, in wages, and other incidental expenses.

## ABBAY CHURCH, ARDENNES, NEAR CAEN.

One of our lithographic illustrations in this impression is reproduced from a drawing supplied to us by Mr. Fred. C. Deshon, representing the west front of Abbey Church, Ardennes, near Caen.

## HEALTHY AND UNHEALTHY WATERING PLACES.

THOSE who have not yet decided where to spend their holidays will do well to give a thought to the comparative healthiness of the various watering places as indicated in the following statistics taken from the quarterly statement of the Registrar-General, just published:—

The following places stand first on the scale of salubrity: Scarborough, Lowestoft, Ramsgate, Brighton, Worthing, Littlehampton, Bognor (notwithstanding three fatal cases of fever), Isle of Wight, Sidmouth, Torquay, Tenby, Beaumaris, Tunbridge Wells, Cheltenham, Malvern, Leamington, and Buxton. In all of these the mortality rate was below 17 per 1,000, and zymotic disease, except in Bognor, was not very prevalent. The following places stand second on the health scale, the mortality rate being 17 and below 20: Herne Bay, Deal and Walmer, Dover, Hastings and St. Leonards, Eastbourne, Weston-super-Mare, Aberystwith, Bangor, Rhyl, Bath, Clifton, Matlock, and Harrogate. The following places occupy the lower third place in the health scale; their mortality rate was 20 and under 23: Whitby, Yarmouth (scarlet fever very prevalent); Southend, Margate, Folkestone, Weymouth (scarlet fever prevalent), Exmouth, Dawlish, Penzance, Ilfracombe, New Brighton. The following places were the lowest in the scale of health; the mortality exceeded 23 in 1,000. They are, Lyme Regis, Dartmouth, Llandudno (diphtheria), Southport, and Blackpool and Fleetwood (measles). The mortality of places fluctuates from accidental circumstances; and it may happen that places unhealthy in spring may be healthy in summer; but the general indications of the Table deserve attention. There can be no doubt that while the sanitary arrangements of some watering places are excellent, in others they are open to great improvement; and this is the case especially with

those of the low third and fourth class. The description of Margate by Dr. Gwynne Harries,\* which should be one of the healthiest towns on the coast, is truly deplorable. Ilfracombe, in many ways charming, has recently suffered by neglecting, as Margate has done, the warning voice of its medical men.

## THE TEMPLE OF DIANA AT EPHEBUS.

THE following letter has appeared in the *Athenæum*, and by the courtesy of the editor of that journal we are able to reproduce the plan referred to.

8, Craig's-court, Charing-cross, July, 1874.

I sent you last year a plan of the Temple of Diana at Ephesus,\* which was made from the particulars obtained up to that time, but the extraordinary dryness of the past season enabled me to clear the entire site of the Temple, and the platform on which it was raised, to a much greater depth than heretofore. The accompanying plan (p. 121) is consequently more correct, and, indeed, may be relied on as perfectly correct, in its main features, the data being: the two columns of the peristyle, made "*in situ*," a number of the foundation piers and intermediate walling, the walls of the cella, where coloured dark in plan, portions of which remain, and the whole of which could be traced impressed on the foundations of a church which was built within them some centuries after the destruction of the Temple. Portions of the lowest step of the platform on three sides have also been recently found, and fourteen of these steps must have been required to mount to the pavement of the peristyle. The foundations of the south-west Anta and of the altar were found last season, and these features remain the same, as well as the spacing of the columns of the peristyle, excepting at the east end, where two are added, and the position of the columns there is now adapted to freshly-ascertained facts.

I have supposed that there were one hundred columns in the peristyle and pronaos, the thirty-six *columnæ calatæ* of Pliny being the two front rows of columns at each extremity, and the four in the pronaos.

It is possible that the cross wall, with the doorways at the east end of the cella, did not exist, and that the cella extended for the whole length between the two walls coloured dark, the existence of which is certain; this would place the statue of the goddess exactly in the centre of the cella. All the walling coloured of a lighter shade is conjectural.

I have in former letters accounted for other characteristics of the plan, such as the gradual increase of inter-columniation at each front, and the additional two feet at each extremity on the flanks.

The pronaos was separated from the peristyle by an iron grille, which I suppose had a central gate. All the dimensions given on plan may be relied on as correct. J. T. WOOD.

## CHIPS.

The Sanitary authorities of Brimyard, Worcestershire, have referred the several plans proposed for the disposal of the sewage of that town to Mr. Bailey Denton, C.E. In the case of Hitchin, Herts, where the Local Board has been revived after many years' suspension, it has been resolved that the opinion of Mr. Bailey Denton be ascertained in regard to the best means of disposing of the sewage at the outfall, and also for reducing or abating the nuisance to Grove Mill, whilst preparations are made for more permanent works if necessary.

A statue of Lord Palmerston was placed in Parliament-square on Tuesday, and the unveiling will take place as soon as the foundation is secured.

The Freemasons of Sheffield intend erecting a new Masonic Hall, at a cost of about £10,000.

A new cemetery, for the use of Nonconformists, is contemplated at Nantwich.

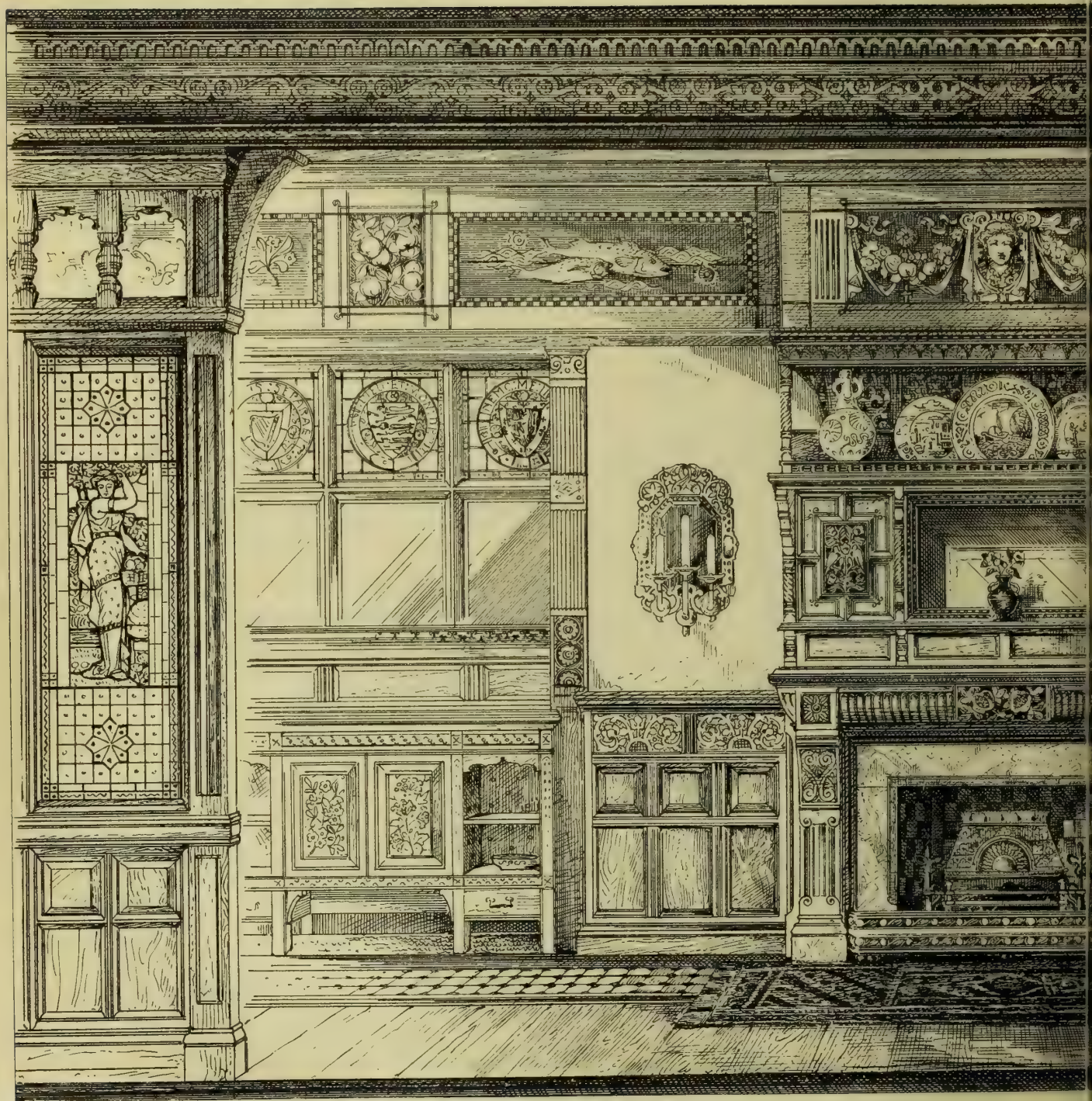
The foundation-stone of the Ryde School of Art was laid on Monday last.

\* Dr. Gwynne Harries's "Report on the sanitary condition of the Borough of Margate, and the prevalence of certain kinds of disease therein," printed by the Local Government Board in August, 1873.









SCREEN, DECORATION, &c., EXECUTED

DESIGNED BY J. B. B.



WS AUG. 21. 1874.



Photo-Lithographed & Printed by James Akerman, St. Grays Inn Road. W.C.

D · BY · MESSRS · JACKSON · & · GRAHAM,

ALBERT · ARCHITECT



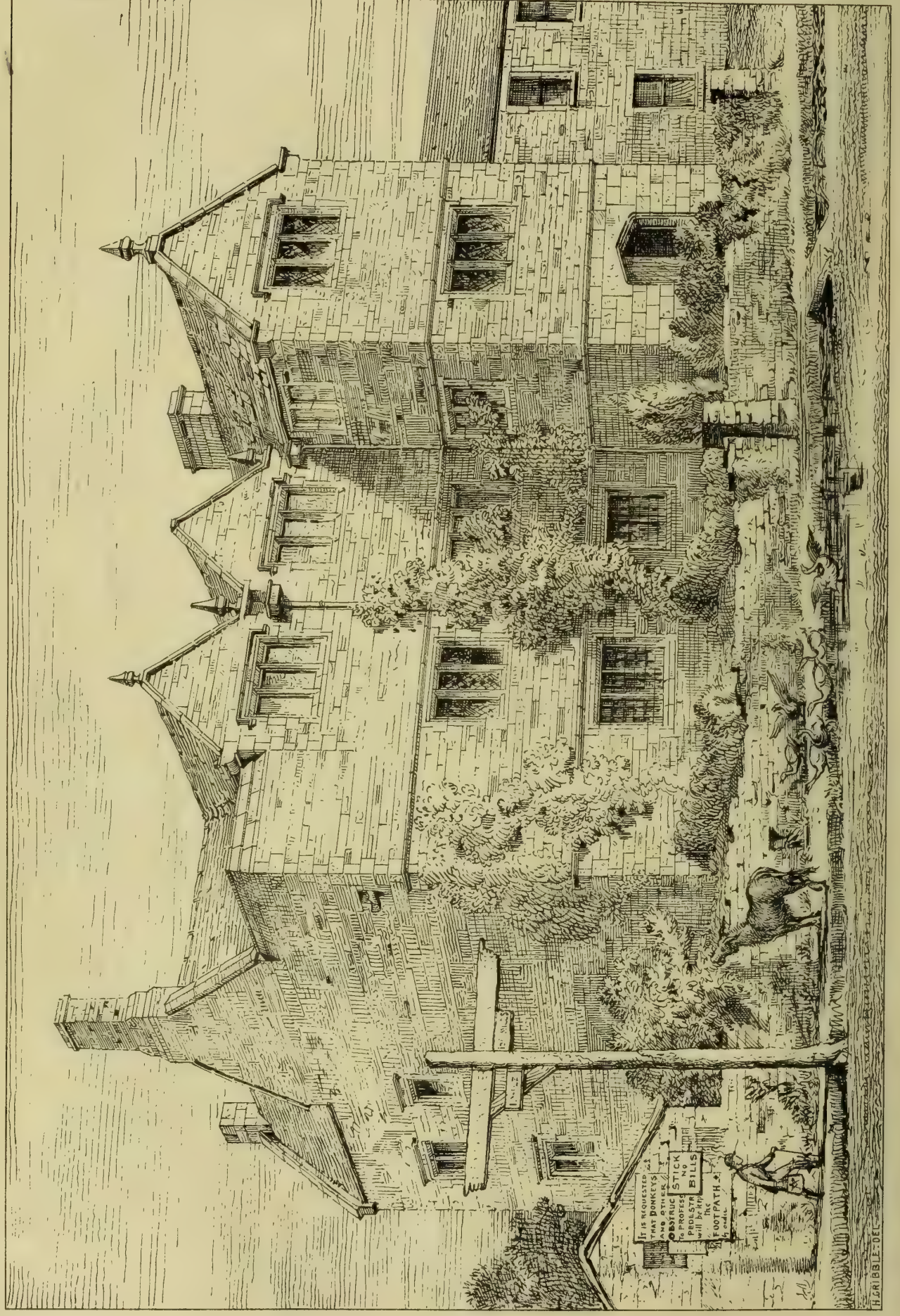








THE BUILDING NEWS AUG. 21. 1874.

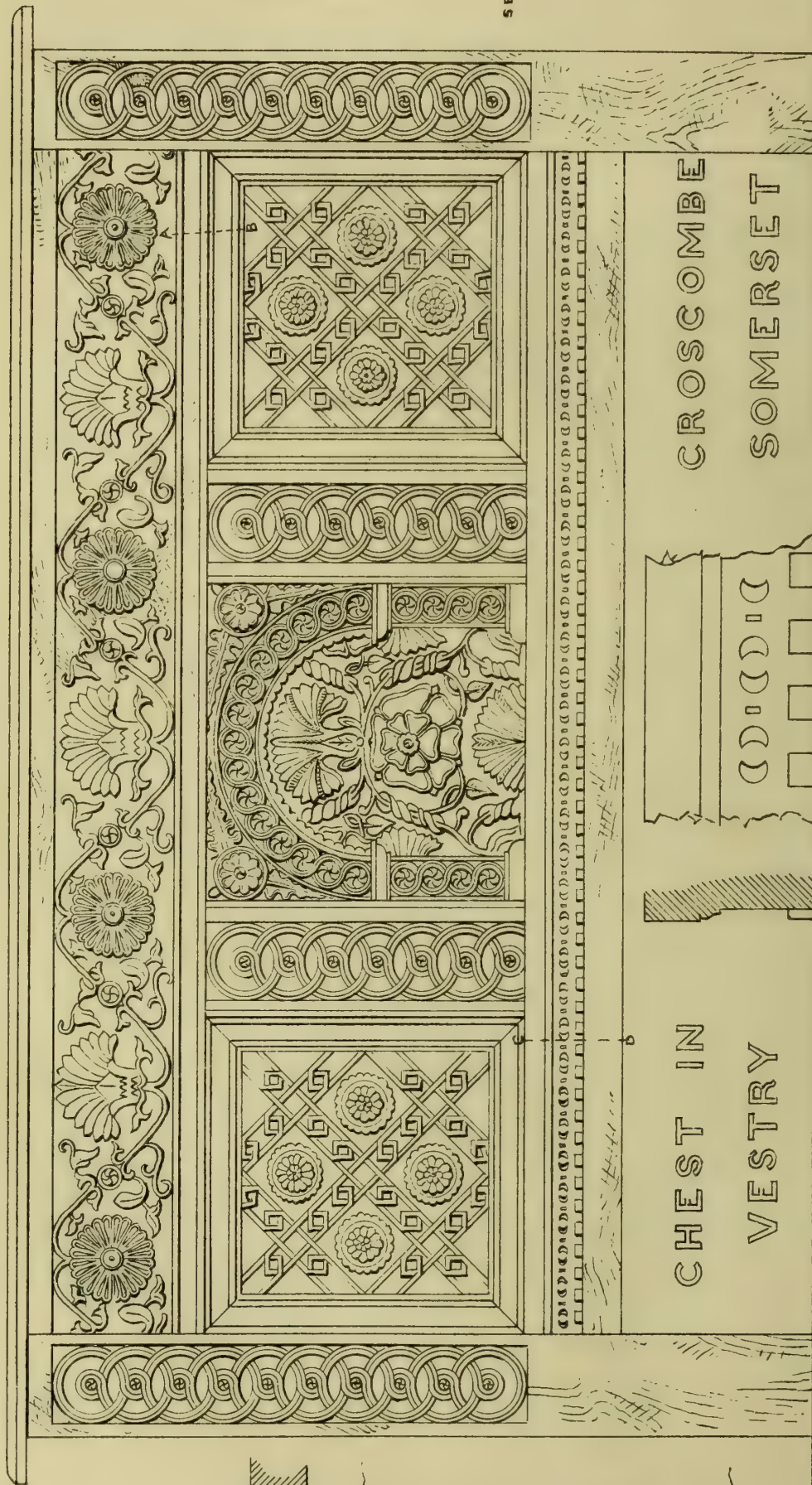


ANCIENT HOUSE, BELMERRY









DETAIL  
OF LID.

SECTION A-B.

CHEST IN  
VESTRY

CROSCOMBE  
SOMERSET

0 1 2 3 4 5 6 7 8 9 10 11 12  
inches

SCALE FOR ELEVATION.

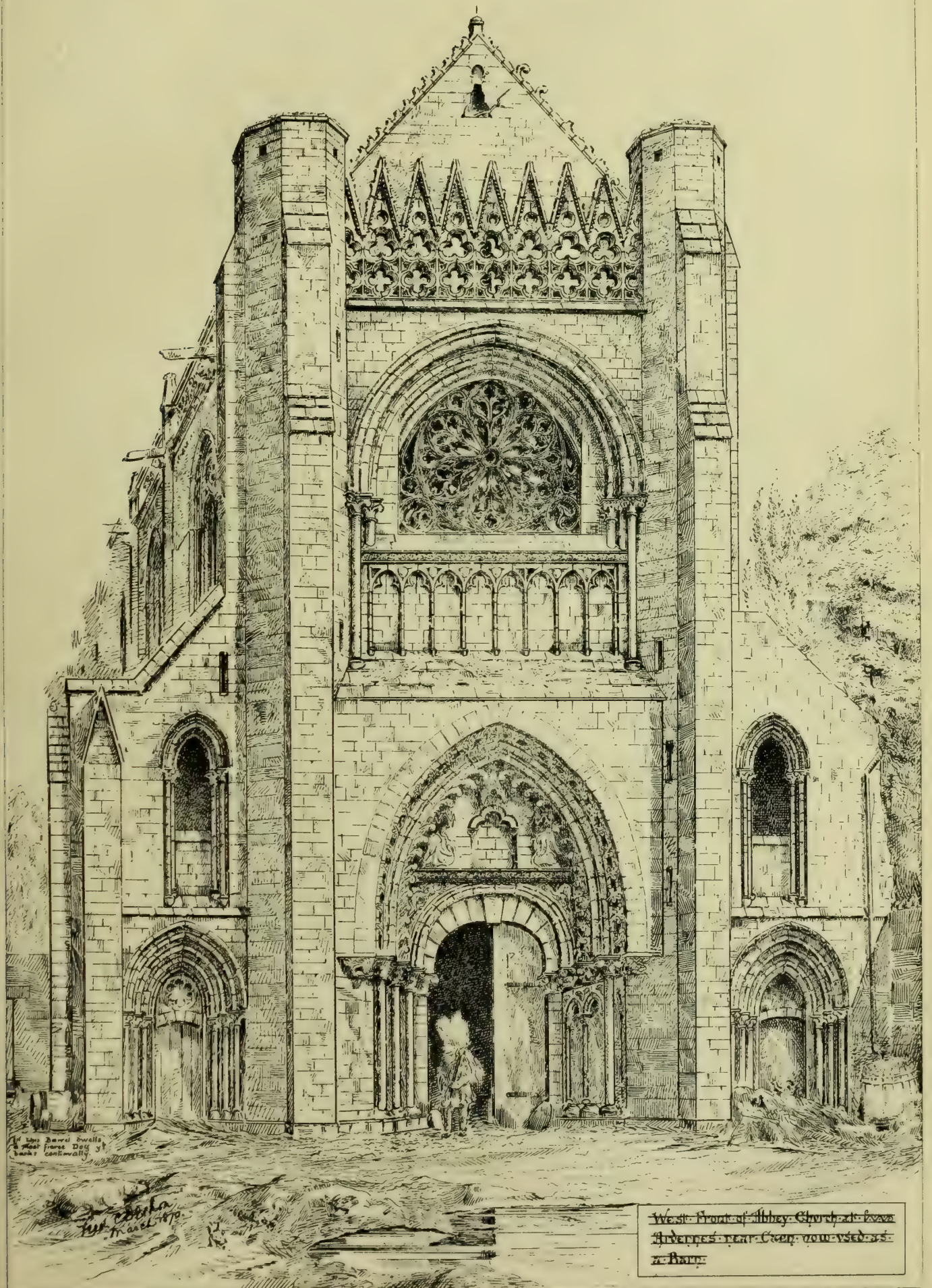
0 1 2 3  
SCALE FOR DETAILS.

DETAIL C-D

MEASURED AND DRAWN

BY C. P. EDWARDS.





West Front of Abbey Church at Exeter.  
Ruined. Plan. Comp. now used as  
a Barn.







*Workshops Thames Ditton for Messrs Cox & Sons*

*S. J. Nicholl Architect.*

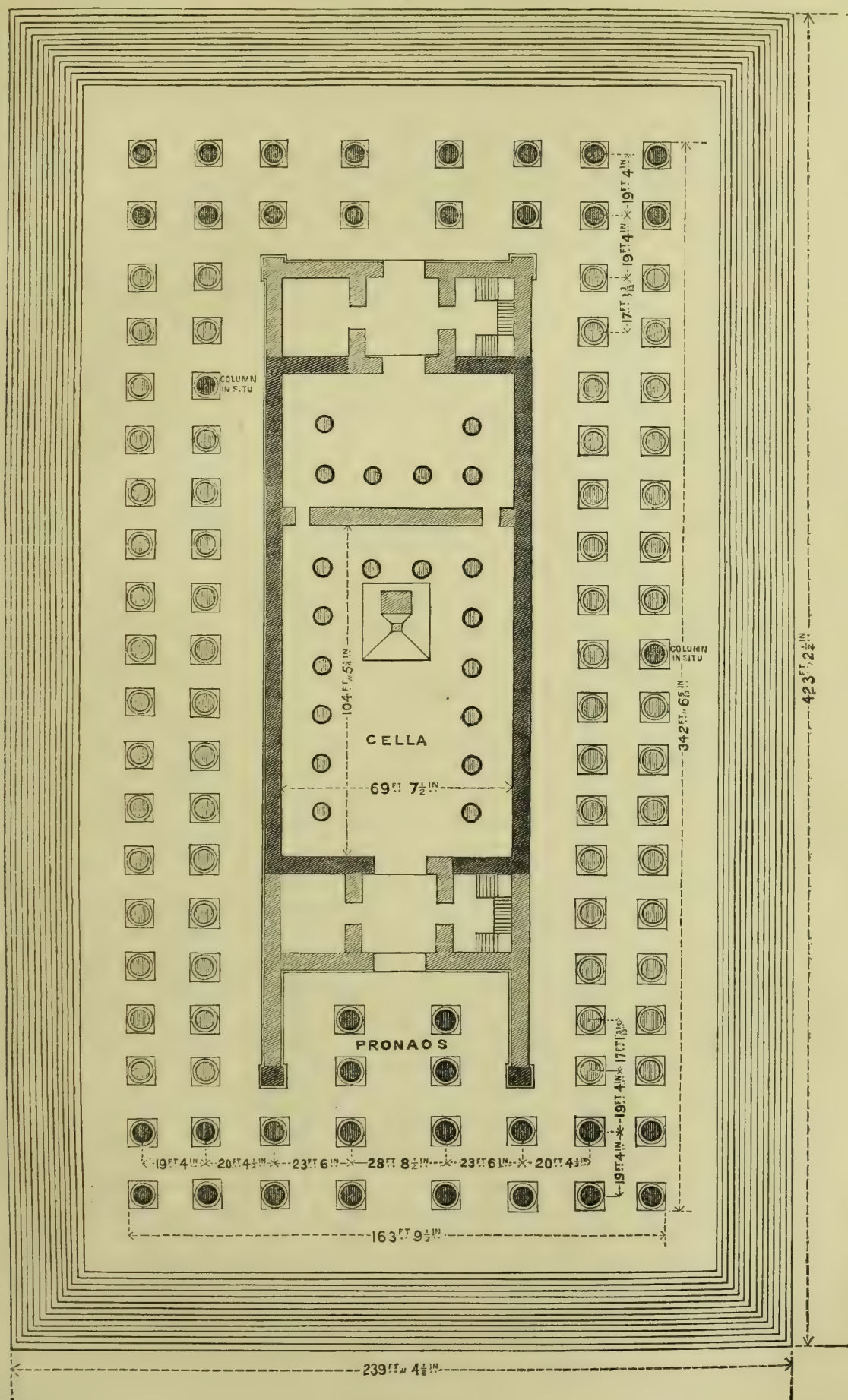








TEMPLE OF DIANA, EPHESUS.



FROM THE *ATHENÆUM*. (SEE PAGE 224.)



## NOTES ON IMPROVEMENTS.

**WATER-TIGHT JOINTS.**—It is one of the practical difficulties attending laying stoneware pipes that, however truly-shaped they may be, the inequalities inseparable from their manufacture or the process of burning prevent anything like a true and reliable joint being made. Stoneware pipes are subject to various vicissitudes—they are liable to alternations of dryness and moisture the surrounding ground and subsoil, to settlements and dislocations arising from excavations and disturbances of the surrounding soil. These risks make it necessary to form good water-tight joints, which shall not easily get disturbed. Ordinary cement joints are useless; they crack under the slightest settlement or expansion of the pipe; and although clay is better, it is liable to yield under pressure or from any changes in the state of the ground. Beyond these inconveniences, is the time, skill, and labour involved in making these joints, and the necessity of excavating round the pipe to enable the workman to effect a good joint.

Messrs. H. Doulton and Co. have manufactured a joint known as "Stamford's Patent Joint," which, we think, meets these difficulties, and what we think is still more important, enables stoneware pipes to be laid by the most unskilful hands without liability of imperfection at the joints—a point of some moment to contractors who generally employ unskilled labour for this kind of work. The improvement consists in casting rings of pliable, yielding, and, we are told, durable material upon the spigot and in the socket of the pipe. These are cast by moulds, and the pipes when put together have simply to be pressed close and a true mechanical fit is ensured, equal to a bored and turned iron pipe joint, and in some respects superior. The rings are made slightly conical or spherical in section, so that on pressing one pipe into another the joint is tightened. The advantages claimed by the manufacturers are absolute water-tightness; no percolation from subsoil or from pipe; no skilled labour needed; efficiency under settlement; and avoidance of cement and clay, though a little grease may be rubbed over the joint. Having seen specimens, we can say it appears to be the simplest joint for the purpose.

## STONEWARE EFFLUVIUM TRAP.

In the sanitary appliances at the International Exhibition at South Kensington, among some other traps is one deserving notice, patented by Mr. McNeil Greig, of Fulham. It is made in one piece of stoneware, the inlets for soil, sink, and waste-pipes forming part of it. A man-hole and perforation for ventilation are also provided. The dips are simply the prolongations of the soil and sink-pipe inlets. From the facilities it affords for ventilation and cleansing, also for connections with the pipes, we think it will be a useful substitute for the ordinary siphon trap and cesspool.

## WINDOW SASHES.

The ordinary window sash and frame, despite the censure cast upon it for its very unbending and inartistic qualities, still maintains its hold among the common-sense public and builders. Much as the architect has done to vanquish it as the bugbear of plain common-sense Classic, his patrons the public as persistently acknowledge its claims over casements of all sorts; and even those who desire to have their newly-built villa in some pretty London suburb provided with Gothic oriels and "mullioned casements," after the latest and most correct taste, are often compelled to admit the superior advantages the common sash window has in more palpable qualities than the sentimental or picturesque. However, there are several ways in which it may be improved; and let us first refer to the useful. Some years ago Mr. J. Gorman, builder, of Southampton, invented and patented a new sash pocket and fittings for the better cleaning, repairing, or painting of windows. Though it has had a local reputation, and has been employed in many good houses in the neighbourhood, it has never been so fully used as it deserves, though models are to be seen at the Museum of Construction, South Kensington, and the Architectural Museum, Conduit-street. We are afraid architects are prone to pass by such improvements.

The improvement consists in being able to take out the sashes instead of taking off the beads, and damaging thereby the frame. Instead of the ordinary sash pocket, which enables only the weight to be removed, and which is usually fixed in such a manner that, when a line breaks or a sash has to be taken out, its removal becomes a

work of difficulty, and in the hands of a jobbing carpenter, one of bungling also, the improved pocket is made in two parts hinged together, the lower half being fastened by a flush or snap-ring at the end. This pocket also has the parting-bead attached, and is made about 2in. longer than the bottom sash, but the aperture in the pulley stile is not made to the whole length of the pocket, but only long enough to get out the weight, the other portion of the pocket being fitted into a sinking in the stile. By this means, when it is required to take out the sash, the lower sash is raised, the snap-ring taken and pulled out, which also draws out the lower part of pocket, and another downward pull draws out the remaining part, which is hinged. This operation being performed, and the weight disconnected, there now is left a sufficient sinking in the pulley-stile; and it is only requisite to bring the sash opposite this sinking, and pull it out. In the same manner the top sash can be taken out after the weights have been disconnected. The weights and lines are easily detached from the sashes by a patent socket piece let flush into the edge of sash stile. Having used the invention ourselves, we know its merits. A common window double-hung can be taken out in a minute, and replaced as quickly. No beads require removal—a great advantage, as it at once saves the expense of damaged frames or disfigured painting or graining. The greatest advantage of all is that anyone with a small screw-driver can replace a broken sash line, and broken glass can be soon repaired. All ladder work is superseded, and the danger of outside window cleaning avoided.

One of the greatest improvements in window-sashes would be some means of superseding weights and lines; and though we have seen many ingenious attempts, they do not appear to fully answer the desired end. The idea of making one sash balance the other by a pulley is open to the objection that it only permits the sashes to be simultaneously opened, and patent fittings, pulleys, &c., have been introduced for this purpose by the inventor of the sash-pocket and others.

## THE CITY OF LONDON WATER SUPPLY.

ON Tuesday a voluminous report was issued to the members of the Court of Common Council by the Gas and Water Committee of that body, in answer to the reference "whether any improvement can be suggested in the supply of water to the City of London in case of fire, either by fixing hydrants in certain of the public ways, or by other method," and further as to the practicability of devising some plan "whereby an abundant supply of water can be drawn from the Thames to be used for the purpose of extinction of fires, cleansing the streets, and flushing the drains of the City, to ascertain the probable cost of the necessary works, and report thereon." The committee at great length furnish a statement of the past legislation and inquiry relative to the supply of water for extinction of fire, from the reign of Queen Anne in 1707, mentioning the various Acts of Parliament passed since that date, and the results of the decisions come to by the several committees of the House of Commons which have sat upon the subject. The report next refers to the present condition of the water supply of the City, and it appears that the City receives its water supply almost entirely from the New River Company. The *Engineer* says that the company have now provision for a continuous daily delivery of more than 36,000,000 gallons of water with a present daily demand of about 25,000,000 gallons; and they also have a right to pump to "any" extent from the river Thames below Blackfriars for any service of a "non-domestic" kind. Also that exclusive of the ponds at Hampstead and Highgate, which hold together about 30,000,000 gallons, the company have high service reservoirs containing more than 20,000,000 gallons, and further store at lower levels of more than 100,000,000 gallons. The company's engine power is now sufficient to raise water into their upper reservoirs at the daily rate of 50,000,000 gallons, and all the contents of these various reservoirs are available for use in the City, in which they have 78 miles of pipes, 25 miles of which are constantly under pressure. With regard to the water supply required for the extinction of fire in London, Captain Shaw has reported that in the whole of the metropolis it had not been much in excess of 8,000,000 gallons, and Captain Shaw distinctly stated to the committee that there had been no difficulty from any

insufficiency of water supply for extinction of fire in the City, whatever occasional delay there might have been in obtaining the required service. It also appeared that the pressure of the present water supply of the City had sufficed hitherto, and might be greatly increased. The committee, however, express their opinion that the system of street plugs, which makes the attendance of a turncock necessary before water can be obtained, is not suitable to meet sudden emergencies which must necessarily occur in every case of fire, and that to secure a quick obtainment of water it is absolutely essential for the protection of public property that a proper number of constantly-charged hydrants be fixed which will represent an immediate supply of water. As to the cost of the hydrants to be erected in the City, it was a question whether it should be borne by the Corporation or the Metropolitan Board. The report will be considered at the first Common Council after the recess.

## IMPORTS AND EXPORTS OF BUILDING MATERIALS DURING 1873 AND 1874.

	Seven Months ended 31st July.	
	1873.	1874.
Glass—Window and German sheet, including shades and cylinders	cwts. 256,967	274,237
Flint	" 44,598	32,521
Plate, silvered or not.	" 22,499	32,868
Manufactures unenumerated	" 128,309	177,408
Iron and Steel—Iron, bars unwrought	tons 34,060	36,331
Iron manufactures	cwts. 336,313	568,468
Steel, unwrought	tons 6,294	2,225
Lead, pig and sheet	" 37,217	37,441
Tin	cwts. 102,325	90,848
Hewn Timber, Russia	loads 117,343	231,296
" Sweden and Norway	" 364,952	372,321
" Germany	" 160,888	203,859
" B. N. America	" 119,814	71,132
" other countries	" 281,435	427,449
Sawn or split timber—		
Russia	" 200,575	273,796
Sweden and Norway	" 696,561	801,089
B. N. America	" 261,569	257,122
Other countries	" 105,068	180,458
Staves of all dimensions	" 35,975	60,170
Mahogany	tons 29,912	36,431
Zinc, crude, in cakes	" 9,607	10,391
" manufactures	cwts. 136,157	133,142
EXPORTS.		
Iron and Steel—Iron bars, unwrought	tons 9,652	11,670
Steel, unwrought	" 315	641
Tin	cwts. 14,753	26,801
Copper	" 405,473	418,012
Glass—plate, rough or silvered	sq. ft. 1,343,881	691,171
" Flint	cwts. 76,607	61,921
" Bottle	" 534,785	572,445
" Other manufactures	" 73,079	68,819
Iron and Steel—		
Pig iron	tons 733,606	382,665
Bar, angle, bolt, and rod	" 175,581	131,707
Railroad	" 425,550	505,164
Iron and steel wire	" 18,337	17,491
Hoops, sheets, &c.	" 125,358	83,990
Tinplates	" 79,124	69,388
Unenumerated, cast or wrought	" 168,003	153,457
Old	" 43,478	23,408
Steel, unwrought	" 24,382	17,041
" manufactures	" 6,158	5,404
Lead	" 18,097	23,917
Tin, unwrought	cwts. 61,020	101,787
Zinc	" 40,385	40,655

## WATER ANALYSIS.

AT the meeting of the British Medical Association on Thursday week, at Norwich, Dr. C. J. Fox read a paper "On Water Analysis; as it should and should not be performed by the Medical Officers of Health." Dr. Fox observed that the elementary principles upon which the greater part of the work of the Medical Officer of Health was based might be said to be the prevention of water pollution and of air pollution with the products of decomposing filth. The examination of drinking-water formed a very important portion of his duty in his crusade against preventable disease. The most rough and ready way which has been employed for ascertaining whether or not water was polluted with organic



matter was to partly fill a clear bottle with a sample of it, and having violently shaken the same to take a hearty sniff at the air of the bottle which had been agitated in the water. If the air smelt sweet and fresh, the absence of an injurious amount of organic matter was inferred, and vice versa. It should be borne in mind that the existence of an unpleasant odour or taste about the water from a well sunk through certain kinds of clay was no proof of the pollution of water with organic matter. Water, if allowed to remain long in contact with certain kinds of clay, acquired such an objectionable smell as to be at times quite undrinkable, and yet might not at the same time contain an amount of organic matter which would warrant its condemnation. A well of this kind could be made to furnish excellent water by the frequent withdrawal of its contents, or, if that was not practicable, by the filling-up of the dug portion of the well, and by drawing the supply solely from the bore pipe. Dr. Fox, in closing a paper of considerable length, said his object in bringing the subject of water analysis before the Association, which numbered among its members so many Medical Officers of Health, was the hope that some uniform plan of examination might be adopted by all.

#### THE PLYMOUTH NEW TOWN HALL.

WE have received more than one communication in reference to the architectural authorship of this building. But as the local architects, Messrs. Norman and Hine, have not questioned the authenticity of our statement a fortnight since with regard to the design being virtually that of Mr. E. W. Godwin, we see no reason to continue the discussion. It is, however, somewhat marvellous that in all the local descriptions, and amid the festivities of opening, the name of Mr. Godwin was not mentioned. This persistent silence was no doubt intentional. One correspondent says it was acting the character of Hamlet omitting Hamlet himself. Another correspondent offers some comments on this subject, and with particular reference to the recent controversy in the *Times* anent "Borrowed Plumes." We see from a Plymouth paper that there is likely to be a lawsuit arising out of some criticisms on the workmanship of some portions of the building. Mr. Pethick, the builder, feels so much aggrieved at what the *Western Daily Mercury* said, and what we alluded to on page 211 last week, that he has threatened legal proceedings. The *Mercury*, conscious of the substantial accuracy of its remarks, this week taunts Mr. Pethick for putting on the cap which suits him, and reproduces the objectionable passages. If Mr. Pethick is right, no doubt he will be able to sufficiently vindicate himself. But if he should happen to be wrong, it would have been better had he taken a leaf out of Messrs. Norman and Hine's book, who, when it was stated that they were not the architects of the building for which they were taking all the credit, said nothing. Now public attention is called to the matter, and in the end the truth will establish itself.

#### ARCHÆOLOGICAL SECTION OF THE BIRMINGHAM AND MIDLAND INSTITUTE.

A NUMBER of the members of the Archæological Section of the above Institute set out on Thursday week, via Worcester, for Ledbury; some of them for one day's excursion, and the others for two days, into Herefordshire and the Wye district. Reaching Ledbury about half-past eleven, the members made their way to the parish-church, where they were met by the rector, the Rev. J. Jackson, who pointed out and described the many features of interest which the building presents. There was originally, he said, a Norman church of the plan of the present one, the only remains of which are the west door, the chancel arcades, with their curious piers with square bases and circular upper stage, and the small round clerestory windows in the chancel. He also pointed out the capitals of the piers of what was presumably the original nave arcade, with their grotesque later carvings; the fourteenth century north chapel, with its door and windows profusely decorated with the ball-flower ornament, the curious brasses, and the monumental effigies

which the church contains. One of these was more particularly described with reference to one of the effigies in Much Marcle Church. After a vote of thanks, the members made their way to the Feathers Hotel, where luncheon awaited them. At two o'clock a start was made in carriages for Much Marcle. The parish-church here is an unusually interesting structure. Approaching it by a narrow pathway from the road, the attention of the visitor is at once directed to the well-proportioned fifteenth century tower, and by the twin gables of the thirteenth century chancel and adjoining north chapel, both of which terminate in elegant wheel crosses. The appearance of the interior of the church has been marred by the blocking-up of the clerestory windows by some later roofs to the thirteenth century aisles, but it is still of unusually good effect. In plan it consists of nave, north and south aisles; central tower, clear of the aisles, and without transepts; and chancel, with north chapel. Another peculiarity in the structure of the church is, that it follows the slope of the ground from west to east, so that the eastern side of each arch in the nave arcades is longer than the western. There is some good Early English carving on some of the capitals. The font is of plain Norman work. The oak reredos is an old fireplace from a mansion in the parish. Attention was called to the considerable remains of the octagonal base and shaft of the cross in the churchyard; to a moated space adjoining the boundaries, which is said to be the site of one of the castles of the Mortimers, and to a giant yew tree which adorns the churchyard. This grand old tree measures 28ft. 7in. in girth at 4ft. from the ground, and is stated by Mr. Edwin Lees, F.L.S., of Worcester, to have attained the age of 1,200 years. The party were soon on their way through some pleasant Herefordshire lanes to Kempey, where they were met at the church by the rector, the Rev. A. H. Drummond, to whom is owed the discovery and preservation of what are probably the oldest mural paintings of any extent in England. The church is externally a small, plain Norman building, consisting of nave and chancel, with a low thirteenth-century west tower. Until quite recently the interior was covered with the usual coating of whitewash, but the removal of this coat at the hands of Mr. Drummond has brought to light almost the whole of the twelfth century decorations of the church. On the walls of the chancel are painted representations of the Twelve Apostles, the ceiling of the barrel roof is covered with paintings representing our Saviour, the symbols of the Evangelists, St. Mary, St. Peter, and other figures and symbols common to ecclesiastical art. On the south side of the east wall is painted a bishop, in twelfth-century costume, in the act of benediction, and there are also traces of a representation of the Trinity. The nave of the church was similarly decorated, though the remains of the paintings are by no means so complete as those in the chancel. The carriages were again called into service, and the journey to Ross resumed. After a pleasant drive through some of the finest scenery of Herefordshire, the Royal Hotel, Ross, was reached at about half-past five, where tea was provided. After tea the church was visited, and its interesting monuments examined. The party then broke up, those returning to Birmingham leaving by the 7.0 train, and reaching Birmingham at 10.18, and the others staying at Ross, to go on next day to Goodrich, Tintern, and Chepstow.—On Friday last about thirty members of the section visited the Wye district. The road taken was that crossing the river by Welton Castle, an interesting little ruin. Leaving this the members made their way to Goodrich Castle, one of the most picturesque and interesting ruins which the section has yet explored. The gatehouse is almost perfect in its lower stages. Approached by a drawbridge over the moat, it had an outer gate, then a double portcullis and an inner gate, all of them defended by loopholes, access to which was gained by a gallery within the thickness of the walls, while above each gate are the usual provisions for pouring missiles on the heads of assailants. Passing through the gateway, the attention of the members was at once arrested by a lofty and singularly graceful pier supporting two arches at the opposite angle of the castle. Adjoining the gateway is the chapel, of which considerable traces remain. From the chapel a covered way led to the tower in the south-west angle of the castle of the castle, and it is in this tower that the interesting carvings on the walls, which have been described in the *Archæological*

*Journal*, are to be found. In this building is a trefoiled headed recess, opposite the doorway on each landing, which may have served the purpose of a place for a lamp, or were used as drains. The Norman keep stands midway in the courtyard, between the tower just referred to and the banqueting hall. It has some good mullioned windows, some of which have been curiously altered to square-headed fifteenth-century window, and is a good example of its date. In the basement of the keep there is a strong room, about 15ft. square, with an inner cell entered by a low-pointed archway, but with little provision either for air or light. This is, it is said, a prison constructed under license from Edward III. to Richard Talbot. With the exception of the keep, the present remains are all of Edwardian work. From Goodrich the members went on their way to Monmouth, where they stayed to examine the Gate House on the Welsh Bridge. The object of this building, and the peculiarities of its structure as a fortification having been pointed out, the drive to Tintern was resumed. A careful examination of Tintern Abbey having been made, the party broke up, some to walk over the Wyndcliff, and others to visit Chepstow Castle. The remarkable situation of this castle, on a steep, narrow rock overhanging the Wye, and the necessity of following the line of this rock in building the fortifications, appear to have determined the singular plan of the buildings, and at the same time have given an unusually picturesque appearance to them when seen from the opposite side of the river. The principal entrance to the castle is by the gatehouse nearest to the town; this is defended by two remarkably fine towers, on the parapets of which are the remains of stone figures of bowmen placed over each merlon. Passing through the gateway into this first court, we find the smaller hall, with buttery, kitchens, store-rooms, and cellars adjoining it. From the latter provision has been made for supplies to be hoisted from boats on the river. On the opposite side of the court, in the angle formed by one of the towers and the wall of the castle, is a small oratory, with its windows richly decorated with a rose ornament, but of which the tracery has disappeared. Leaving this court, we past through a doorway into the inner bailey, where there is a great hall, built on walls of Norman masonry, separated from the chapel by a stone screen of thirteenth-century work. The only remains of the screens are the corbels and base of the pier which supported the upper portion of it. Beyond the great hall is a third court, from which there is a postern, and at the end of the court the second gateway to the castle. The castle is a good illustration of the Edwardian type at its most advanced stage, and the members made good use of the opportunity thus afforded to them for the study of Mediæval military architecture. On Saturday morning a visit was paid to Chepstow Church, of which Mr. E. A. Freeman says: "Among the accumulations of successive periods of barbarism there lies concealed the nearly perfect nave of no contemptible Norman minster," and which has passed through the hands of the restorer, and he has only swept away those accumulations to substitute for them a barbarism which is rare even in the restorers' work of this century. The west front only has been let alone, but the rich Norman porch has also been restored. There are some Elizabethan monuments in the chancel. The excursionists then drove to Raglan Castle, along the valley of the Usk. After a brief stay to examine the enormous boulder on the top of the hills by the British encampment of Gaer Nawr, a halt was made a little farther along the crest of the hill for the enjoyment of the scene. From here a short drive brought the party to Raglan Castle, a fine example of fifteenth-century work. The secretary briefly told the history of the building and fall of the castle, and pointed out the peculiarities of the structure. After this inspection of the building and of the museum of objects of interest found during excavations on the site, the members dispersed over the ruins, some of them to ascend the keep, which is here outside the walls of the castle; some to examine more carefully the exquisite Elizabethan fireplaces; and others to admire the panelled and traceried windows of the rooms over the gatehouse, while a few managed also to make an examination of the earthworks and exterior fortifications. After luncheon the visitors drove back to Chepstow, and, leaving Chepstow at 5.30, they spent an hour in Gloucester in an inspection of the cathedral, and, again taking train, reached Birmingham at 10.30.



# BERKSHIRE ARCHÆOLOGICAL AND ARCHITECTURAL SOCIETY.

THIS Society made its second excursion on Tuesday, the 11th inst., Windsor being this year selected. The visitors having viewed the Castle, Mr. Albury, V.P., read a paper dealing with the history of the town and Castle. Mr. Albury pointed out that when the Doomsday Book was compiled, the Castle, which had been lately built by William the Conqueror, was within the manor, and probably the parish, of Clewer, of which Windsor was formerly a chapelry. A new barbican or outwork was added to the Castle by Henry III. in 1263. All historians agreed that the Castle owed much of its magnificence to the affection which Edward III. bore to the place of his nativity. Walsingham relates that, in 1334, he built a chamber, which he called the round table, 200ft. in diameter. This by other accounts appears to have been only a temporary structure. Other extensive works were shortly begun, and the best workmen that could be got were impressed in the King's service, but the wages were not so tempting as to prevent many from leaving, and writs were issued for their apprehension, and commissions issued to the sheriffs of several counties to impress more workmen. Very few commissions were issued after the year 1369, and none after 1373, so that it may be presumed that this noble work was then completed, comprising the King's palace, the great Hall of St. George, the lodgings on the east and south sides of the upper ward, the round tower, the chapel of St. George, the canons' houses in the lower ward, and the whole circumference of the walls, with the towers and gates. St. George's Hall, on the north side of the upper ward, was built as a refectory for the Knights Companions of the Garter; it is a noble room, 108ft. in length. The ceilings and walls were painted by Verrio, in the reign of Charles II., the subjects being the triumphs of the warlike founder and his brave son, Edward the Black Prince. The present oak-panelled ceiling and lining to walls was commenced by King George IV., and finished in the reign of King William. King Henry I., it is said, built, or rebuilt, a chapel here, dedicated to St. Edward the Confessor. This chapel was again either rebuilt or considerably enlarged and decorated by King Henry III. It seems beyond doubt that this was the original of the present St. George's Chapel, and Edward III. is supposed to have rededicated it to St. George on rebuilding it. The present building was in progress during several reigns, and it could not have been entirely completed till after the 7th of May, in the tenth year of Henry VIII., as in a chapter of the Garter then assembled it was decreed that a levy or subscription should be raised among the Knights for the purpose of finishing some of the interior work. Mr. Albury thought it might be questioned whether Edward III. did rebuild the chapel, since there are yet extant the letters patent of Richard II., dated 1390, appointing the celebrated Geoffrey Chaucer clerk of the works to this chapel, which is described as threatening ruin, and likely to fall to the ground; but we are not informed of any repairs executed here under his direction. It was probably the state of ruin in which this chapel continued to remain that induced Edward IV. to commence rebuilding it. He, in 1476, constituted Richard Beauchamp, Bishop of Salisbury, master and surveyor of the work, and he was empowered to pull down buildings and remove all impediments in order to enlarge the chapel, which Ashmole informs us was extended "in length at least a hundred fathom." Mr. Albury thought it probable that Beauchamp designed the work himself, and continued: The internal proportions of this chapel present a remarkable deviation from customary arrangements of that period with respect to the relative widths of the nave and side aisles, and to the small projection of the transept beyond the side walls. Whilst the aisles preserve a general accordance with other religious edifices, the nave is of much greater expansion; this circumstance has given to the vaulting a peculiar character; for, as the arches are depressed, the fanlight tracery on each side, instead of being carried out from the impost to the central or key-line of the vault, extends only to one-third of the distance, and the intervening or middle space is overspread by diversified panelling enriched with pendants. Of the aisles it has been remarked that "they have all the magic perspective of the cloisters at Gloucester, even improved by loftiness." The tracery of the compartment over the organ-screen

is the most elaborate; here, within a radiated circle in the centre, are the arms and supporters of Henry VIII.; the contiguous panels of the framework are embossed with the arms of the contemporary Knights of the Garter. The transept is terminated at each end by a small and elegant chapel, which, branching from the plane of the side wall, includes five sides of an octagon; that on the south displays the cognisance of Sir Reginald Bray, and is said to have been erected by himself for his own burial-place. The flanking turrets are on a similar octagonal plan, except on the north-east, where there is a rectangular chapter-house. Originally the great east window was divided by mullions into three principal compartments, each subdivided into five, and again horizontally, by embattled transoms, into six tiers of cinquefoil headed lights; but both transoms and mullions were removed in George the Third's reign, to make room for modern painted glass from a design by the late Benjamin West. This has again been replaced to its original design, and the present painted glass substituted, under the direction of the late Prince Consort. Referring to the castle, Mr. Albury said: Upon the Restoration, King Charles II. finding the buildings much dilapidated by plunder and neglect, caused it to be thoroughly repaired and richly furnished, and the ceiling and wall decorations by Verrio were done under his direction. The terrace on the north side of the castle was made by Queen Elizabeth, and was extended along the east and south sides by Charles II., and may now be regarded as the noblest walk of its kind in Europe, as well as the most interesting in situation.

At the conclusion of the paper, Mr. Seabrook observed that probably the principal entrance-hall was one of the oldest parts of the Castle, as it dated back to the time of Edward III., embracing a period of 500 years. He pointed out that its arches and springers were composed of chalk, an architectural feat that the modern architects and builders were as yet unable to perform. The company then divided—one part leaving to inspect the State apartments, and the other those on the ground-floor, including the kitchen and a postern, or subterranean passage, of very great interest, lying between the York and Augusta Towers. From an extract made by Mr. Howe from Captain Luard's report, and read by Mr. Albury, it appeared that there was no reliable evidence of the actual date of the postern, although it was supposed from the character of the stonework to be of the time of Henry II., or possibly of a still earlier date, as there was but little doubt that William the Conqueror, or whoever else first constructed a work of defence on Windsor Hill, made posterns or galleries from the interior down to the main ditch. This postern, as well as others that had been discovered of a similar character in different parts of the Castle, all communicated with the old Castle ditch, the solidity of the chalk which forms the subsoil of the hill enabling galleries to be pierced through it. The Queen's drawing-room was inspected, with other rooms comprising the private apartments, Mr. Seabrook giving an ample description of the principal features, dwelling more particularly upon the improvements that had been effected in that part of the Castle by Sir Jeffrey Wyatville in the reign of George IV., and subsequently by Sir Gilbert Scott and other architects of eminence. After visiting the Round Tower, the party proceeded to St. George's Chapel and the Curfew Tower and Crypt, thus concluding a very pleasant excursion.

## ARCHÆOLOGICAL

CHICHESTER CATHEDRAL.—An altar has just been placed in the Lady Chapel, the open framework of which is the gift of Mr. J. F. France, of London. The top of the table is composed of the altar slab of Sussex marble, which archæologists who are familiar with the cathedral will remember as having been for many years built in the wall of the south nave aisle. There are five plain crosses cut on the slab.

IRISH ILLUMINATED MSS.—To the report of the Deputy-Keeper of the Public Records, which has just been published, Mr. W. B. Sanders contributes an account of the Irish MSS. which have been photo-zincographed at the Ordnance Survey Office, Southampton, for the volume of facsimiles of National Manuscripts of Ireland. These

consist of Gospels, Psalters, and annals of the tenth, twelfth, and later centuries, preserved at Dublin, Oxford, Cambridge, and London. In the "Gospels of Mac Regol," from the Bodleian Library, there is a curious illumination, which Mr. Sanders describes minutely, representing a man charming a serpent. This seems a singular subject for an Irish artist, whose country has always boasted an immunity from venomous reptiles. Another remarkable peculiarity in the same volume is the use of the Lion as the symbol of St. John, and of the Eagle as that of St. Mark.

ROMAN REMAINS.—Some interesting Roman remains have been turned up by some labourers in making a road at Hoddesdon from Burford-street to Ware Valley. A trench about 8ft. long and at a depth of 2ft. was dug into, and several Roman vases of terra-cotta of various sizes and patterns were found. A spearhead 9in. in length was one of the relics, and a number of coins and bones were come across close by. Roman pottery, vases, and brass coins have also been discovered in the neighbourhood, leading to the supposition that it was a Roman burying-place.

SUSSEX ARCHÆOLOGICAL SOCIETY.—The annual meeting of the Sussex Archaeological Society was held on Thursday week. The churches of Sompting, Broadwater, West Tarring, and Clapham and Beeding were visited. The party was more numerous than usual. At the end of the journey the company dined in the Society's marquee erected on the lawn of Castle Goring, the residence of Sir Percy Burrell, M.P., who presided, supported by Sir Walter Stirling and others.

THE ROCK OF CASHEL.—As a correspondent of the *Guardian* remarks, few antiquities in Europe, and none in Ireland, are more interesting than those which stand grouped on the summit of the Rock of Cashel. There is the combination of cathedral, castle, palace, and chapel of a king, all marked by architectural features of a most singular kind. The entire range of partly ruinous structures, not being required for church purposes, and involving some expense in preservation, passed, after the Act of Disestablishment, into the hands of the Board of Public Works. A controversy now arises as to the steps taken by that department for the protection of these ecclesiastical relics. Sir M. H. Beach, during the last week of the Parliamentary session, in reply to a question put by Mr. M. Henry, stated that the board "did not intend to restore" any of the buildings. The Rev. J. Graves writes to the journals expressing astonishment at this reply, as on a late visit to the Rock he found a number of workmen, under the command of a clerk of works, engaged on the ruins. Mr. Graves truly says that incalculable injury may be done unless the workmen be controlled by some one perfectly acquainted with the styles in which ancient churches were built.

THE SURREY ARCHÆOLOGICAL SOCIETY.—The annual excursion of this Society was held on Wednesday, the 5th instant, under the presidency of W. Wainwright, Esq., J.P. The members and their friends assembled at Woking Railway-station at 11 a.m., where from twenty to thirty vehicles were in waiting, and conveyed them to Woking Church, which was described by Ralph Nevill, Esq., F.S.A. The essayist commenced by giving the earliest known accounts of the edifice. "There was a church mentioned in Doomsday Book," said he, "as standing on this very spot." The present building, however, may be chiefly designated Early English; the east window, the other windows, and the piscina, for instance, were of this date; the east window was very good, in spite of a more modern "fireworky" attempt at stained-glass design in same; the other windows had, however, good specimens of stained glass. The tower, screen, and piscina in south aisle, he should date from 1330 to 1350. The font and chancel walls were Early English. There was an old chest in the tower, containing a miscellaneous collection of old parochial and other parchment documents and papers, many of which he read to the meeting. The company then dispersed to examine the windows, brasses, font, and other details referred to by the essayist; the massive doors at the west end and the quaint wrought-iron hinges on the same particularly attracted attention. These hinges are referred to in "Parker's Glossary." Apropos of these hinges, Parker says, "No hinges of earlier date than the Norman style can be referred to, and they are not often met with so



old; they are to be found on the inner west door at Woking Church, Surrey, and at Compton, Berks; at this period they had not, in general, much scrollwork attached to them, and the turns are often very stiff; the principal branches at the head of the hinge frequently represent the letter *C*." A short walk through the quaint old town of Woking brought the members and visitors to the site of the Old Hall, at Park Farm, where a descriptive paper was read to them by R. A. C. Godwin Austen, Esq., F.R.S., &c. The ancient manorial residence of Woking, now a farm, said Mr. Godwin Austen, was a royal manor from the time of King Edward the Confessor to that of Richard Cœur de Lion, who gave it away. The manor, after the execution of Hugh de Spenser, again reverted to the Crown in 1327, and was conferred on Mortimer, who was also executed. Henry VII. settled the manor on his mother, Margaret, Countess of Richmond. King Henry VIII. used the manor as an occasional place of resort, and it was here that Cardinal Wolsey brought the letter appointing him a Cardinal. The manor next passed to Barbara, Duchess of Cleveland. Sir Edward Zouche, knight, next owned it. At Pyrford, T. Graham Jackson, Esq., M.A., made some interesting remarks on the church, which has recently undergone restoration, and during this process the remains of some wall paintings were discovered beneath the many coatings of whitewash, and which they had done their best to preserve. The pews were partly new and half of them the original, all of oak. The old pews and roof were of the same date and in fair preservation. The pulpit was made of deal, and was a very rare example of pulpits made of that material; it had been restored, and had a panel inserted in the front with this device inscribed—"N. B., 1628." He had endeavoured to discover who "N. B." was, but he had not been successful. There were two bells. The register does not go back further than 1666. Mr. Jackson concluded by strongly commending the great simplicity of this church as a contrast to the manner in which we overloaded some of our modern churches with meretricious details and decorations. He ascribed to the church the period of the twelfth century. The meeting then adjourned to Pyrford House, where the Rev. T. M. Ridsdale, M.A., rector of Wisley and Pyrford, gave a brief history of the mansion formerly existing there, very few remains, however, were now visible. Like Woking Farm, Pyrford House was now the property of the Onslows. There was no glebe house at Pyrford. The original intention of the Society of visiting Wisley Church, according to the programme, was then abandoned by them for want of time. They then proceeded to Hoe Place, the residence of the President, *via* a pretty route, from which the members had an admirable view of the remains of Newark Abbey. At Hoe Place Mr. Godwin Austen, F.R.S., gave a sketch of the history of the mansion in connection with that of Woking Palace and Park. The beautiful painted staircase and chamber, which he also described, and said were of the same period as the paintings at the Hampton Court Palace, and probably painted by the same artists, afforded much pleasure and delight to the members and visitors. They all then adjourned to the lawn, where a large marquise or tent had been erected, and under which they assembled and sat down to a collation most hospitably provided by the President, William Wainwright, Esq., J.P. After inspecting the exterior of Hoe Place, the beautiful grounds, and the conservatory, particularly some Nineveh marbles that had been presented by Mr. Layard to a former owner of Hoe Place, and inserted by him in the walls of the conservatory, the company once more resumed their carriages and were driven to Horsell Church, where they were very kindly met by Thomas Milbourn, Esq., the hon. secretary of the Middlesex Archaeological Society, and heard the contents of a paper read by him on the church.

Three thousand workmen employed in Lord Penrhyn's slate quarries at Bethesda, in North Wales, have struck work, demanding an increase of wages.

A new Unitarian chapel for West Bromwich has been commenced. The builders are Messrs. Stockton and Sons, of Oldbury, and the designs have been prepared by Mr. Pipson, of Ann-street, Birmingham. The chapel is intended to accommodate 300 or 400 persons. The estimated cost of the building is about £1,400.

## Building Intelligence.

### CHURCHES AND CHAPELS.

**ERISWELL.**—The parish-church of Eriswell, near Mildenhall, Suffolk, was opened on the 11th inst. The church is, architecturally, of great interest. Built continuously throughout the whole of the Early English period and the commencement of the Decorated period, having lancet windows, Plain Geometrical, Ornamented Geometrical, Transitional, and one Decorated window (the east window), it has also an almost unique peculiarity, in a square Early English window, filled with tracery diverging from a quatrefoil in the centre. The arcade between nave and aisle rests on octagonal columns; that between Ladye-chapel and chancel on clustered columns. The font is a very perfect example of Early English work. For a long period, however, the building had been in a lamentable condition; the Ladye-chapel having been walled out and used at one time as the parish school. The cost of restoration has been £1,250. The restoration has been done under the direction of Mr. J. Drayton Wyatt, the architect to the diocese.

**ETON.**—The interior of St. John's Church has been restored, the stonework having fallen into decay. The restoration was entrusted to Messrs. Wheeler, of Reading, under the superintendence of Mr. Ferrey, architect, of London. The College authorities defrayed the expense.

**HORTON.**—The chancel of the parish-church of Horton, Buckinghamshire, is being restored in stone at the expense of the Rector, the Rev. R. G. Foot. It contains a monument, and the remains of Sarah Milton, the great poet's mother, who died in 1637. For six years John Milton attended this church, Horton being the residence of his parents. This place has long been celebrated for the nightingale—hence Milton's sonnet to that bird. Near to Horton Church is the site of Milton's house.

**HUNTINGTON.**—The parish-church of All Saints, Huntington, Yorks, was reopened on the 13th instant, after restoration, under the direction of Mr. C. T. Newstead, of Coney-street, York. When the work of restoration was begun, the edifice, which is Perpendicular in style, dating from the fifteenth century, consisted simply of chancel, nave, and south porch, the chancel roof being higher than that of the nave. Both roofs were concealed from view internally by a lath and plaster ceiling. The stone sedilia and piscina appear to have belonged to an earlier structure. In restoring the church it was determined to rebuild the porch, carefully preserving the semi-Norman doorway, to entirely rebuild the nave and add thereto a north aisle, so as to give increased accommodation, to substitute for the nave roof, with the ceiling underneath, a high pitched and open-timbered roof, to re-seat the whole of the church, to raise the chancel roof, and to restore it a chancel arch which it once possessed, to rebuild the vestry, and lastly to complete the work with a tower, surmounted by a spire. All that was intended at the commencement has been carried out to the letter, at a total cost of £2,553. The new north aisle, which is co-extensive in length with the nave, is separated from it by a lofty arcade of three bays, the arches being supported by two columns, containing shafts of red Aberdeen granite, having richly carved capitals of conventional foliage. The cost of the erection of the tower and spire has been borne by the Rev. J. R. Morton and John Hoyle, Esq., of Huntington Hall. The vicar has also presented the font and the churchyard cross, the latter being from a design of Mr. D. A. Walter, of Scarbro'. The stonework has been executed by Messrs. Bowman and Clark, of Barker-lane; carpenters' and joiners' work, Mr. John Brown, of Monkgate, the sole contractor; and plumbing and glazing, Messrs. Hodgson, of Stonegate.

**PORTSMOUTH-HILL.**—A church on Portsmouth-hill, in the Early Norman style of architecture, has been consecrated by the Bishop of Winchester. The site was given by the Right Hon. G. Hardy, on the understanding that a certain number of the sittings be appropriated to the use of the garrison in the adjacent forts. The church has been erected at the sole cost of Mr. J. Deverell, of Purbrook Park, who has contributed nearly £5,000 for the purpose, exclusive of the endowment of £150 a year.

**SHEFFIELD-ON-LODDON.**—The parish-church of Sheffield-on-Loddon was restored two years

ago, with the addition of a tower and a redos by Salviati, the expense being borne by the rector (the Rev. A. G. Barker). The walls, however, lacked colour, and at the rector's cost the church is being decorated in Sgraffito, in very elaborate design, by Messrs. Wheeler, of Reading, under the direction of Mr. J. W. Hugall, the architect, and superintended by Mr. G. Vickery, clerk of the works, from Barnstaple, who it is stated, was the first to introduce this kind of work in the adornment of our churches. Sgraffito, which was fully described in the *BUILDING NEWS* for March 21, 1873, Vol. XXIV., p. 345, is a sort of etching or cutting out in the plaster. It is done by first laying on the floating coat in the ordinary way, upon which a coat of colour is spread, or as many colours as may be desired. On this coloured coat the finishing coat or outside layer is laid, through which the design is cut and scraped off where desired, the colour behind being thus exhibited.

**ST. DAVID'S CATHEDRAL.**—Archdeacon Allen appeals for help in the restoration of St. David's Cathedral. He says:—"Twelve years ago the aspect of the cathedral was lamentable in the extreme. The crushed condition of two of the four piers, sustaining a load of 4,600 tons in the central tower, seemed to make its ruin imminent. At one time a cat could walk in and out of the cracks that intersected the south-west pier. Those piers have now been rebuilt, and the tower (humanly speaking) is secure. The choir is of singular interest, and is now fitted for worship. The church is among the first in our country as a storehouse of Mediæval tombs of bishops and knights. The ceiling of the nave is in some respects unmatched. Bishop Vaughan's chapel, of the age of King's College Chapel at Cambridge, will not yield in the beauty of its details to that marvellous structure; and throughout the earlier work of the cathedral the delicacy and fancy of the carving show that the skilful artists there employed rejoiced in giving of their best. Ten thousand pounds from the Ecclesiastical Commissioners, and at least an equal sum from friends and neighbours, have been spent during the last ten years in providing for the stability of the fabric, in roofing the north transept, the aisle north of the chancel, the chapter-house, and in the restoration of the choir. If the beauty and interest and special needs of this fabric were better known, some wealthy Englishmen might be disposed to offer of their abundance to perfect the work that still remains to be done under Sir G. Scott's direction. Possibly some who have appreciated Bishop Thirlwall's munificence, justice, and careful devotion of his great powers to his work, may be inclined at this time to undertake the restoration of the Lady Chapel, or of the western front, as a testimony to their sense of his worth.

### BUILDINGS.

**MESSRS. GOSTLING'S SHAFT, NORTHFLEET.**—The 220ft. chimney-shaft at Messrs. Gostling's Cement Works has just been rebuilt according to the original design. The cap, however, which was generally considered by those who saw the previous chimney to look rather small in proportion to the size of the shaft, has been enlarged in the rebuilding, so as to have 11ft. 6in. in height of oversailing work, instead of 10ft. as before. The special precautions which last year's accident showed to be indispensable were taken to ensure the thorough wetting of the bricks, and to prevent the working-up of mortar or cement after it had once set or been "killed." The architect was Mr. James Cubitt; the contractor for the labour was Mr. Blagburn, and Messrs. Gostling, as before, supplied their own materials.

**READING.**—Last week workmen were engaged removing a portion of the entrance to the Town Hall, preparatory to the erection of the new Municipal Buildings, and there is now a probability that the new and handsome buildings from the designs of Mr. Waterhouse will be completed as quickly as possible. The contractors are Messrs. Parnell and Son, of Rugby.

**THE PANTECHNICON.**—The work of reconstructing the Pantechnicon has already made rapid progress, and in the course of a short time the structure, as remodelled, will be completed. The building, in its new form, will be built in eight separate blocks or sections, 18ft. apart, each with an independent entrance. These blocks will be subdivided into rooms and compartments, fitted with double wrought-iron doors. No timber will be employed, but in its place wrought-iron joists and girders will support the concrete floors, whilst the inner and outer walls will be



built entirely of fireproof bricks. Arrangements have been made for a continuous supply of water, both by night and day, direct from the main, laid on to hydrants on every story of the building. An immense tank, capable of holding half a million gallons of water, and also connected with hydrants, is being constructed. To prevent the possibility of the pipes freezing in the winter months, the joints will be kept warm by means of the apparatus used for airing and warming the building. The ornamental front of the building which escaped the flames will be retained in its original form.

## SCHOOLS.

**BRISTOL.**—The first school erected by the Bristol School Board, in St. Philip's, Bristol, was opened on Monday. Mr. Stuart Colman is the architect, and Messrs. Bevan and Sons, of Bedminster, the builders. The ground-plan is in the shape of the letter L. The building is of brick, with freestone dressings, its height upwards of 60ft. whilst its length is over 100ft. There will be accommodation for 650 children. The contract was for £3,300, and the total cost will be about £4,500.

## TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

## ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 9d. per line.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

## TERMS OF SUBSCRIPTIONS.

(Payable in advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom. To the United States £1. 6s. 6d. (or 6 dols. 40c. gold). To France or Belgium, £1. 6s. 6d. (or 32 francs 60 centimes). To India (via Southampton) £1. 16s. To any of the Australian Colonies, New Zealand, the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1. 6s. 6d.

N.B.—American and Belgian subscribers are requested to remit their subscriptions by International P. O. O., and to advise the publisher of the date and amount of their remittance. If the last-mentioned precaution is omitted, some difficulty is very likely to arise in obtaining the amount. Back numbers can only be sent at the rate of 7d. each, the postage charged being 3d. per copy. All foreign subscriptions unaccompanied by an additional remittance to cover the extra cost of forwarding back numbers are commenced from the next number published after the receipt of the subscription.

Cases for binding the half-yearly volumes, 2s. each.

Subscribers receiving their copies direct from the office are requested to observe that the last number of the term for which their Subscription is paid, will be forwarded to them in a coloured wrapper, as an intimation that a fresh remittance is necessary, if it be desired to continue the subscription.

RECEIVED.—J. K.—A. M'L.—C. M. R.—Messrs. S. Bros.—C. H.—J. E. A. G.—J. C.—C. J. J.—W. H. R.

STUDENT (The sketches are not "measured," but simply sketches).—S. M. (Would it not be much better for you to point out the errors of the book to the author or the publisher, so that they might be corrected in a future edition?)

## Correspondence.

## NORWICH CATHEDRAL.

(To the Editor of the BUILDING NEWS.)

SIR,—The following rumours relative to the "restoration" with which Norwich Cathedral is now being visited, will, I hope, be speedily contradicted by some competent authority.

The fifteenth-century windows in the triforium are to be destroyed, "Modern Norman" ones taking their places.

The fifteenth-century arcades on both sides of the choir are to be demolished, for the purpose of "restoring the original Norman work."—I am, Sir, &c.

G. H. J.

August 15, 1874.

## Intercommunication.

## QUESTIONS.

[3426].—**Brown Stone.**—Will some reader say what quarry of brown sand or other stone is best suited to alternate with Bath stone in the proposed arch of a large window?—WEST OF ENGLAND.

[3427].—**Damp-proof Course.**—What is now the acknowledged best damp-proof course? I should like the result of actual experience, and not an agent's opinion.—WEST OF ENGLAND.

[3428].—**Circular Arches.**—Would any of your numerous readers kindly inform me how to obtain lines for working the stone voussoirs of a semicircular headed window in a circular tower, with a heavy archivolt moulding, which is returned at the impost and carried horizontally round? My principal difficulty is in finding the form of the moulding at the various joints of the voussoirs, and the intersection at the impost; and to retain the same breadth, or appear the same breadth on the face.—A. H.

[3429].—**Duties of Land Steward.**—Can any of your obliging readers inform me what are the usual duties of a land steward?—F. H.

[3430].—**Removing Old Paint.**—Among other restorations in a Minster, the old paint has to be cleaned off the large west doors. It is unknown when they were painted, and the paint is very thick and hard from being exposed to the weather. I should be greatly obliged if any correspondent will tell me the best means of cleaning it off without damaging the wood (oak) or tracery.—J. S.

## REPLIES.

[3399].—**Pressure on Sluice Valve.**—I send the following solution to problem 3399:—Let  $v$  equal velocity of water in 27in. pipe when the end is shut and water flowing through orifice; let  $v_o$  equal velocity of flow from orifice; let  $h$  equal loss of head due to friction in 27in. pipe (in feet per mile; let  $h_o$  equal total loss of head in feet, due to velocity of issue from orifice; let  $n$  equal length of pipe in miles equal 5.22; let  $d$  equal diameter of 27in. pipe in feet equal 2.25; let  $\frac{d}{m}$  equal effective diameter of

orifice equal  $\frac{d}{3.35}$  (supposing that area of stream equal  $\frac{1}{8} \times$  area of hole; let  $H$  equal total head of water in feet equal 550; let  $P$  equal pressure on end valve in lbs. per square inch. Then  $h$  equal  $\frac{2.3v^2}{d}$  (Weale);  $v_o$  equal  $m^2v$  (since velocity is inversely as area);  $h_o$  equal  $\frac{v_o^2}{64.4}$ ,  $\therefore h_o$  equal  $\frac{m^4 v^2}{64.4}$ ;  $H$  equal  $(n h + h_o)$  equal  $v^2 \left( \frac{2.3 n}{d} + \frac{m^4}{64.4} \right)$ ;  $\therefore v$  equal  $\sqrt{\frac{H}{\frac{2.3 n}{d} + \frac{m^4}{64.4}}} = 8.02 \sqrt{\frac{H d}{148.12 n + d m^4}}$ ;  $P = (H - \text{loss of head due to } v) \frac{62.5}{144} = (H - n h) \frac{62.5}{144} = (H - n \frac{2.3 v^2}{d}) \frac{62.5}{144}$ ;  $\therefore P = \left( 550 - \frac{5.22 \times 2.3 \times (8.677)^2}{2.25} \right) \times \frac{62.5}{144} = 64 \times 62 \text{ lbs. per sq. in.}$

—R. JNO. G. R.

[3410].—**Taking out Quantities.**—The contractor whose tender was accepted is certainly in honour bound (although, perhaps, not legally) to pay the two per cent. If he found, after having tendered, that his price was too low, that is no reason why the architect should be the loser through his mistake. In a recent case a person was engaged to take out quantities and estimate for certain work, but as the estimate exceeded the amount the proprietor intended to expend, he did not accept the estimate, and ordered a new set of drawings and quantities to be prepared, thereby having put the builder to the trouble of taking out the first set of quantities, which were then of no value. In this case the builder recovered payment for his labour, and I think the contractor is just as much indebted to the architect in the case of "Nemo."—A. T. ALLEY, Manchester.

[3412].—**Selenitic Mortar and Concrete.**—I am obliged to the Manager of the Selenitic Cement Company for his reply. Will he inform me of the best proportion of sand to be used for concrete walls? Is six to one too much?—ARISTO.

[3416].—**Breaking Weight of Timber.**—The formula is misquoted. I gave it as follows:—

$B$  = breadth in inches.

$D$  = depth in inches.

$L$  = length between supports in feet.

$\frac{15 D^2 B}{L}$  = breaking weight in tons in centre of beam.—J. G. LYNDE, Manchester.

[3416].—**Breaking Weight of Timber.**—Thanks to "R. Manchester" for bringing up Mr. Lynde's formula. At first sight it seemed much simpler than any other I had come across, and this led to an examination of it. I compared it with Tredgold's, Hurst's, Dobson's, Molesworth's, and P. B. Eassie's formulas, but none of them had any resemblance to it. I hope some explanation will be given on it.—A. H.

[3416].—**Breaking Weight of Timber.**—It is a pity correspondents such as "R. Manchester," in your last impression, do not take the trouble to think over what they read before they undertake to criticise the statements made in public by a gentleman of such great experience as Mr. Lynde. There can be no mistake in your report of his address to the Scientific and Mechanical Society, for it states that "the product of the breadth with the square of the depth multiplied by 15 will give the breaking weight in tons on the centre of a beam of Memel timber." "R. Manchester," confounds sum with product, and from the way in which he attempts to explain a rule that any child of ten years old could work out, he must suppose that you and your readers are as ignorant of algebraic formulae as he appears to be. Mr. Lynde's formula agrees very nearly with the following, which is much employed by architects:— $W = 3 \frac{B D^2}{L}$ ,  $B$  being the

constant for good Baltic;  $B$  and  $D$  being given in inches,  $L$  in feet, and  $W$  in cwt.—J. BLENKARD.

[3419].—**Staircase.**—In answer to "Be sure," I can state that in 1869, in conjunction with my then partner, Mr. T. J. Willson, I planned and erected a double staircase giving separate access to the boys' and girls' schools in Red Lion-street, Wapping, and in 1861 a similar staircase for St. James's Catholic Schools, Marylebone-lane. The latter staircase was illustrated in Laxton's "Examples of Building Construction."—S. J. NICHOLL, Caversham-road, Kentish Town.

[3420].—**Gothic Tracery for Glazing.**—As for "Alpha's" inquiry as to the glazing of stone tracery, it has been my own practice to employ a rebate in the tracery only. The slight difference in the section of the stonework is of no consequence even in continuous tracery. If a rebate is not provided, the glazier either rudely cuts one for himself, as I have seen done, or makes his glass to the sight-line.—S. J. NICHOLL.

[3420].—**Gothic Tracery for Glazing.**—Grooves cut in the centre of mullions generally receive the glass. In small openings the rebate is perhaps the easiest way to insert the glazing; but the groove is the correct way. In some cases, however, the rebate is the only plan that can be adopted.—A. B. C.

[3421].—**Strength of Railway Bridges.**—In reply to "J. S.," he does not give the span of bridge. For an ordinary span of 25ft. to 30ft. span,  $2\frac{1}{2}$  tons per foot run may be taken as a safe allowance for running loads, though in spans of great length a less load decreasing in length of span should be observed. The permanent load may be taken at 5cwt. per foot run for a 30ft. span, an increasing weight being allowed as the span increases. This is supposing wrought-iron used. For broad-gauge the running load may be slightly increased.—G.

[3424].—**Joints of Gothic Vaulting.**—"F's" query is hardly clear. If I understand him rightly, it is immaterial how the joints of filling-in to ribs are set out; they, in fact, must be governed by the ribs themselves.—G. H. G.

[3425].—**Best Drain-Trap.**—Messrs. Doulton, of Lambeth, have some improved stoneware drain-traps. That of McNeil Greig (Fulham) is also a very good one. In every case the trap should be ventilated by apertures. A closed trap is useless.—G. H. G.

## STAINED GLASS.

LEIGH (STAFFORDSHIRE).—The west window of Leigh Church has been filled with stained glass to the memory of the late rector, the Rev. B. F. Bagot. The glass has been designed and executed by the Messrs. Morris, of Queen's-square, Bloomsbury, and consists chiefly of figures and groups from the Old Testament, representing the priesthood, sacrifice, and devoted life, the centre light being appropriately filled with the Crucifixion.

RIPON CATHEDRAL.—A stained-glass window, in memory of the late Rev. Robert Poole, has just been placed in the north aisle of the nave of Ripon Cathedral. The window, which is of five lights, is in the Perpendicular style, and has been filled with stained glass by Messrs. Ward and Hughes, of London. The subjects are arranged in two sets, with suitable canopies over each, the upper and principal ones being "Our Lord Blessing Little Children," "The Charge to St. Peter," and "The Commission to the Apostles." Below are "The Presentation in the Temple," "The Presentation of Samuel to Eli," and "The Teaching of Timothy." In the tracery opening above is an angel choir, very artistically treated. Below is an inscription.



## WATERSUPPLY AND SANITARY MATTERS

**ASTON, BIRMINGHAM.**—The Aston Local Board has, acting upon the advice of Mr. Humber, C.E., of Abingdon-street, Westminster, resolved to construct an efficient sewerage scheme for the district under its control, at a cost of about £80,000. Mr. Humber proposes to construct two intercepting sewers, the first commencing near the Witton Arms, Witton-lane, passing at the back of Aston Church and tavern, and forming a connection with the main outfall sewer at the junction of the Aston-lane and Lichfield-road. This sewer will carry the whole of the drainage of the district on the north side of the Lozells-road and Victoria-road. The second intercepting sewer will commence at Hunter's-lane, following the direction of the Hockley or Aston-brook to the Rocky-lane, and from thence along Wharf-street, Thimble Mill-lane, to the Lichfield-road, terminating with, and forming the junction of, intercepting sewer No. 1, and the main outfall sewer as above. The main outfall sewer will proceed along the Lichfield-road to the Salford-bridge, from thence under the canals over the River Tame, and across the lands of the Corporation to the land agreed to be purchased by the Board, near Bromford Forge. The arterial drains and sewers will be laid out in zones, and connected with the intercepting and main outfall sewers. The difficulty of obtaining suitable land within a reasonable distance precludes irrigation, and Mr. Humber recommends for adoption either the lime process, as carried out at the Birmingham sewage works, or Dr. Anderson's process, as now being carried out at Coventry, these being, in his opinion, the only two precipitation processes of distinctive value.

**BUDE.**—Complaints having been made to the Local Government Board that the Rural Sanitary Authority of the district of Stratton had made default in not providing sufficient sewers for Bude, an inquiry was held last week before R. Morgan, Esq., C.E., the Government Inspector, for the purpose of inquiring into the subject matter of the complaint. A special report of the case will be made to the Local Government Board, and a notice will in all probability be issued, ordering a thorough system of drainage to be carried out without delay.

**DUBLIN.**—The Corporation of Dublin have for many years talked over a scheme for the efficient main drainage of the city, but as yet the scheme only exists on paper. The citizens are, however, growing discontented with the apathy of the Corporation, and have held a meeting, at which resolutions were passed invoking the help of the Crown in the matter.

**IPSWICH.**—The Ipswich Town Council proposes to purchase and take into its own hands the waterworks of the town, and on Tuesday last an inquiry into the subject was held at the Townhall, before Robert Morgan, Esq., C.E., one of the Local Government Board inspectors.

**OPENING OF DENHOLM WATER-WORKS.**—This took place last Saturday. According to the *Scotsman*, the water is brought from the spring to the reservoir in 3in. glazed pipes, by gravitation, at the rate of 28 gallons per minute. The reservoir is constructed of stone and lime, faced with brick, and plastered in Portland cement. It is 45ft. long, 9ft. deep, 8ft. wide, and can hold 21,000 gallons; 3in. cast metal pipes convey the water through the streets, and the pressure will be ample, 80ft. head being obtained. The plans were prepared by Mr. Wilson, and the cost is upwards of £700.

**THE PURIFICATION OF THE CLYDE.**—The Government have consented to appoint a commission to inquire into the pollution of the Clyde, on the condition that Glasgow and the towns interested shall bear the expense.

## LAND AND BUILDING SOCIETIES.

**BRADFORD SECOND EQUITABLE BUILDING SOCIETY.**—The twenty-third annual report shows a steady increase of business, the amount received in subscriptions being £30,000 in excess of the previous year. The year's profits are £2,798. 4s. 3d. A bonus of 5s. is recommended, £200 to be added to guarantee fund, and £190 carried to next year. The shares number 13,622. The number of depositors is 3,695. The assets are—subscriptions owing on unadvanced shares, £450,786. 18s. 6d.; arrears, £934. 6s. 8d.; bank deposits, £4,003; interest from bank, £66. 12s. 4d.; balance, £2,761. 1s. 3d.; total, £458,548. 19s. 9d.

**STAMFORD FREEHOLD LAND SOCIETY.**—The annual meeting of this society was held on Friday week. The balance remaining to the credit of profit and loss on the year's working is £29. 14s. 2d. Out of this sum the committee recommend a dividend at the rate of 5 per cent. per annum, to be added to the amount standing to the credit of each shareholder on the 30th June last. This will absorb £12, leaving a surplus of £17. 14s. 2d. to be carried to the next account.

## LEGAL INTELLIGENCE.

**ACTION BY A COUNTY SURVEYOR.**—**NICHOLLS V. MARSLAND.**—This case, which was tried at the Chester Assizes on the 10th inst., before the Lord Chief Justice Cockburn and a special jury, arose out of the flood near Macclesfield in 1872. The plaintiff is the county surveyor of Cheshire, and represented the county authorities, and the defendant, Mrs. Marsland, widow of Major Marsland, resides at Henbury Hall,

near Macclesfield. The action was brought to recover the amount of damages sustained by four of the county bridges in consequence of the alleged negligence of the defendant in storing water. On the night of the 18th June, 1872, there was a terrific thunderstorm of 10½ hours' duration in the neighbourhood of Henbury, and, according to the testimony of several witnesses, the rainfall was greater than had been known by "the oldest inhabitant." In Henbury Park there are three very large pools or artificial lakes, in connection with which there are two weirs. On the night of the 18th June, the embankment of the pools gave way, and the water rushed in great volume down the Bagbrook—a stream crossed at different points by the Birtles, Alderley, Bagbrook, and Chelford bridges. These bridges were demolished by the flood, and it was for the damage thus caused, owing to the alleged insufficiency of weirs and strength of dams, that the action was brought. Mr. Nicholls gave the following amounts as the cost of the re-construction of the bridges, inclusive of the expense of erecting temporary bridges:—Birtles, £638; Alderley, £928; Bagbrook, £1,777; Chelford, £697. He added that that was the cost of placing the bridges in their former condition. The county authorities were rebuilding the bridges, and making them larger and putting more expensive work in them, but this extra cost was not taken into consideration.—Mr. Henry Bancroft, C.E., Manchester, gave the area and capacity of each of the pools; and a number of other witnesses, including Mr. E. Leader Williams, C.E., Mr. Hill, C.E., and Mr. Jebb, C.E., were examined, their evidence tending to show that the overflow of the pools was attributable to the insufficiency of the weirs and the defective nature of the embankments. They also described the destructive effects of the flood on the night in question in various parts of the district.—The Judge directed a verdict to be given for the plaintiff for the amount claimed, with leave to move to set it aside and enter a verdict for the defendant should the Court be of opinion that the downfall of rain described amounted to a mismajor. His Lordship expressed an opinion that it did not amount to a mismajor.

**BREACH OF BUILDING CONTRACT.**—**KASSELL V. WADDINGTON.**—This case was tried at the Yorkshire Summer Assizes, Leeds, before Mr. Baron Amphlett. The plaintiff was Mr. John Kassell, builder, at Castleford, and he sought to recover damages from Mr. Frederick K. Waddington, of Castleford, for a breach of a building agreement, and compensation for the work which he had performed under the agreement. The circumstances of the case were somewhat unusual. In the latter end of 1871 Mr. Waddington was desirous of erecting a building at Castleford. Mr. Towse was the architect, and the plaintiff was invited to contract for the building work. He sent in an estimate about the 23rd January, and about the 12th February the contract was entered into between the plaintiff and defendant, the plaintiff agreeing to do the work shown upon the plans and specifications for the sum of £277. The plaintiff proceeded with the work, and when he had erected the walls to a height of about one foot some dispute arose between the defendant and the Castleford Local Board as to the width of the street. The building was an oddly-shaped one—one end fronting Bridge-street, on the north, and upon the west side there was a road which was marked on the plans (shown to the jury) as being 23ft. 9in. wide. The plaintiff was not aware that Mr. Waddington, in accordance with the bye-laws of the Local Board, had laid before the Board plans of the building which he proposed to erect, and that in December, 1871, the Local Board had approved of the plans on condition that the street on the west side should be left 30ft. wide. The plans had been put before the plaintiff to contract for without giving him any notice of what had been done by the Local Board, and he estimated for the erection of a building which had been disapproved of by the Board. The plaintiff had accordingly erected the wall as he had described, when he saw the defendant, who told him he must take the wall down, and put it back some 5ft. At any rate, the wall was taken down and put back a distance of between 5 and 6ft. between the 3rd and the 19th March. On the 19th March, the plaintiff received a letter from Mr. Towse, the architect, saying that he insisted upon having the wall built according to the plan, and in accordance with instructions the plaintiff took down the walls and had to build and place them in their previous position. He had got the walls erected in their old position to the height of a yard or two, when, on the 31st of March, the plaintiff got a notice from the Local Board informing him that the building then in course of erection was being erected contrary to a resolution of the Board passed at a meeting on the 16th of November, 1871, and giving him notice to pull down such erection. The plaintiff communicated with Mr. Towse, the architect, who insisted that the wall should be built according to the plan. The plaintiff was thus placed between two fires. He was bound to build as the architect desired, and he was also bound by law to respect the decision of the Local Board. Matters remained in this position for about a fortnight, when the plaintiff received a letter from Mr. Towse, saying that as the plaintiff was unwilling to carry out the work according to specification, he enclosed notice to pull down the wall, &c., and stated that unless he now complied he (the architect) would put the agreement into force. The plaintiff replied that he had received an astonishing letter which he could not understand, and asked the architect to send him a copy of the agreement. To this Mr. Towse replied that the agreement was at his office, where it could be seen. A few days afterwards the

plaintiff received a summons to attend before the West Riding magistrates for a violation of the bye-laws of the Local Board. The plaintiff attended before the magistrates and admitted that he had left the street 23ft. 9in. wide instead of 30ft., as required by the Local Board. He was liable to penalties, but the magistrates took a lenient view of the case, and thought the proper persons to be summoned was either Mr. Waddington or Mr. Towse, who between them had laid the plans before the Local Board. The total amount claimed by plaintiff was £133. 15s. 8d.—A verdict was taken for plaintiff, subject to a reference.

## Our Office Table.

**THE BATH SURVEYORSHIP.**—The Surveyor of Works at Bath and some members of the Town Council do not seem to work well together. A Report of the Committee to consider Mr. Davis's duties has been presented to the Corporation, and is as follows:—"Your Committee therefore report that, upon mature consideration of all the statements made to them, they are of opinion that the duties of the office of Surveyor of Works to the Corporation have not been performed by Mr. Davis with the attention, proper care, and efficiency which the public service requires, and repeated cautions to him to have been disregarded, and they, therefore, recommend as necessary to the satisfactory fulfilment in future of an important public office that his engagement with the Corporation be terminated." Mr. Davis's reply, which was of considerable length, and answered the charges *seriatim*, was then read. It would appear Mr. Davis's private business engagements have been too numerous to enable him to give that attention to his public duties required. We hear a memorial has been presented to the Corporation from tradesmen and others regretting the action taken, and hoping the surveyor may still continue his office, and speaking in high terms of his courtesy and attention. The recommendation of the Committee was negatived.

**LIGHTHOUSES IN AMERICA.**—The lighthouse system of the United States is of considerable magnitude. There is, it seems, 10,000 miles of coast altogether, and nearly every square foot of the margin of the sea throughout 5,000 miles along the Atlantic and Gulf Coast is more or less illuminated by lighthouse rays, the mariner seldom losing sight of a light. There are of lighthouses and lighted beacons 591; ditty finished and lighted during year ending July 1st, 1873, 29; fog signals operated by steam or, hot air engines, 35; day beacons, 363; buoys 2,838.

**ROME.**—According to *The Times'* Italian Correspondent, it appears that the population of Rome may be reckoned now at about 250,000; at the downfall of the Pope's Temporal Power in 1870, it was 226,022, since which time it has increased, and this augmentation is attributed to the sudden immigration of functionaries created by the Italian Government since its installation, Building artisans also came hither to provide for the increased demand. The offices of the public service have not yet all been transferred to the new capital. The new palace is being built at Porta Pia, which will accommodate the administrative officers and *employés* to the number of 4,000. Altogether the establishment of the seat of government here will add about 70,000. The supply of house accommodation is very inadequate, though "bricks and mortar invade every quarter." The old hovels are being transformed into stately buildings. There appears also to be a great deficiency of public offices; the old structures are unfit for the purposes required; and demolition has to precede reconstruction in most cases. The old Roman houses are in a very rickety condition, but there still remains a stubborn resistance to improvement, and it will be many years before the gloominess of the old city will be transformed into cheerfulness and new life. It is said there is not one street in Rome where easy and safe walking can be found, the demolitions and absence of footways rendering passage irksome and often dangerous.

**NEWFOUNDLAND GRANITE.**—A correspondent of the *Scotsman* says that from the west side of Bay D'Espoir to Cape Ray there is great abundance of granite, principally reddish in colour, interspersed at intervals with large masses of various shades of grey, and in great part of splendid quality. During the past summer the lighthouse at Rose Blanche (30 miles from Cape Ray) was



built of granite quarried on the spot. The builder states that the granite was equal in quality to any that he had ever worked, the far-famed Peter-head not excepted. The quantity of this fine stone on that part of the coast is practically unlimited, and will doubtless be largely availed of in the construction of bridges and viaducts on the railway, when that undertaking is seriously taken in hand.

**THE NEW LAW ON RATING** has been printed. Certain exemptions in the Poor-rate Act of the 43rd of Elizabeth are abolished, and lands used as plantation, or a wood, or for growth of saleable underwood, are not subject to any right of common, also rights of fowling, of shooting, or taking or killing game or rabbits, when severed from the occupation of the land, and mines of every kind not mentioned in the recited Act are to be liable to be rated to the poor and other rates. It is not to apply to Scotland or Ireland. It will, it is expected, produce a large sum in poor and other rates.

**INTERNATIONAL EXHIBITION AT CHILI.**—The Chilean Government has fixed the 16th September, 1875, for the opening of an International Exhibition at Santiago. Section 4 is to be devoted to architectural designs, models, plans, &c.; paintings; sculpture, bas reliefs, &c.; engravings, lithographs, &c. Articles for exhibition in this section will be received up to the 25th of August, 1875. All letters relating to the exhibition to be addressed—"To the President of the Chilean International Exhibition, 1875, Santiago (Chili)." Foreign commissions, or exhibitors, preferring to communicate directly with the President of the Exhibition, must forward their applications for space in time to reach Santiago before the 1st of January, 1875. Applications for space must be made on a form provided for the purpose, and addressed to the President of the Exhibition, or to the foreign commission appointed in the country of the intended exhibitor.

**THE TIMBER OF THE UNITED STATES.**—Professor Brewer, of the Sheffield Scientific School of Yale College, has surprised the meteorologists of the Old World, who have been led to believe that the climate of the United States has been gradually changing through the destruction of its forests. He has written a letter, in which he shows by figures that no such destruction has been going on, and if there has been any change of climate, it must be from some other cause. He says that in the older settled portions of the Eastern States—New England and the Middle States—one third of the whole farming area is still woodland, and that if we extend our observations further to the south and west the facts are still more striking. Although Professor Brewer's figures may be quite accurate as to the total extent of woodland in the States, it has lately been shown that in Pennsylvania and some other districts the forests have been totally denuded of timber-trees, so that these districts have had to resort to the Canadian markets for their supplies of timber.

**PRESERVATION OF TIMBER.**—A German chemist, Sigismund Beer, has found that by using borax as a solvent, the coagulation of sap was prevented, and that it could be effectually removed by boiling without injury to the tissues. The wood is rendered thereby closer in grain, and is said to become impervious to decay. Wood so prepared is improved both in colour and texture, and is free from the danger inherent in impregnation with creosote or other oils. By not washing out the borax the inflammability is said to be much decreased.

**ROYAL INSTITUTE OF BRITISH ARCHITECTS.**—A special general meeting of Members only was held on Monday evening last, Mr. John Gibson, V.P., in the chair, for the purpose of considering the recommendation of the Council as to the award of the Royal Gold Medal. Mr. Ruskin having declined the honour, and the Queen having asked the Institute to nominate another gentleman as the recipient of this year's medal, the Council recommended that the medal should be awarded, subject to Her Majesty's sanction, to Mr. G. E. Street, R.A. The recommendation of the Council was adopted.

**DEATH OF SIR WILLIAM FAIRBAIRN.**—The death of Sir William Fairbairn, Bart., LL.D., the well known engineer, took place on Tuesday, at Moor Park, Farnham, Surrey, where he was on a visit to his son-in-law. The deceased was the third son of Andrew Fairbairn, of Roxburghshire. Trained as a mechanical engineer, he

began his career at Manchester. To the building of iron vessels he devoted much attention. He assisted Stephenson in the erection of the Menai tubular bridge; wrote some valuable works on the strength of iron, the collapse of tubes. His "Application of Iron to Building Purposes," "Iron, its History and Manufacture," and "Useful Information for Engineers," are deservedly useful contributions. In recognition of his scientific acquirements he was made a baronet in 1869, and received the degree of LL.D. from the Cambridge and Edinburgh Universities. He was born at Kelso, in 1789, and was in his 85th year.

**THE CRYSTAL PALACE.**—At a meeting of the shareholders of the Crystal Palace Company, on Monday week, to consider a plan for the restoration of the building, Mr. Scott Russell said that he had made an inspection of the Palace at the request of the Reconstruction Committee. The whole of the capital expended on the part of the building which had been burnt down, both upon the building itself and its valuable contents, had been lost, and there had not been any attempt made to restore that part of the structure. There had also been an entire wing of the Palace blown down, and no effort had been made to restore that portion either. He found the whole of the grand cascade of the waterworks, which had cost nearly £300,000, going to ruin. The two cascades lower down were also going to decay, and a great number of the pipes and communications of the waterworks were likewise going to ruin. On looking into the state of the machinery of the waterworks, he was astonished to find that the economical portions had been allowed to go utterly to ruin, while the most extravagant and costly part of the works, which were but seldom used, had been maintained in full working order. As to the courts of sculpture, Mr. Russell found that the works had nearly all gone—where, he could not tell. From some a finger, a nose, or an arm was missing, and, apparently, there had been no attempt to replace the missing parts of the statues. The magnificent collection of art sculpture was in a most disgraceful condition. The four great sculpture courts were entirely gone, and their contents dispersed. The works were in such a state of decay throughout that a very large sum would have to be speedily expended upon the property.

**NEW ACT ON DWELLINGS FOR WORKING MEN.**—An Act of Parliament received the Royal Assent on the day of the Prorogation, the object of which is to facilitate the erection of dwellings for working men on land belonging to municipal corporations in England. It provides that where a corporation determines that land belonging to them shall be converted into sites for working men's dwellings, and on obtaining the approval of the Treasury to the Corporation making for that purpose grants for leases of 999, or for less terms, then the provisions mentioned in the Act are to apply. The costs and expenses are to be paid out of the borough rate, &c. The forms in the schedule as to grants and leases show how concise legal documents can be made. The Act is now in operation.

**THE THAMES CONSERVANCY.**—The Conservators of the river Thames state, in their report of their proceedings in the year 1873, that repairs and improvements have been made, but that they have not had at their disposal sufficient funds to enable them to execute further restorations and improvements still urgently needed on the upper part of the river. For several years past the attention of the Conservators has been directed to the state of the river at the upper extremity of the tideway in the vicinity of Richmond and Twickenham. It has been alleged that, owing to a variety of causes, the depth of water in the navigable channel of that part of the river has diminished. The construction of a lock and weir having been demanded, the Conservators have carefully considered whether such works would remedy the defect. Being mindful of the peril to the proper condition of the river below, which the exclusion of a large amount of tidal water by a lock and weir would occasion, the Conservators sought the best engineering advice they could procure to assist them in forming a right judgment. After mature consideration of the advice thus obtained, and of the representations of the inhabitants of the district and others interested in the question, the conclusion to which the Conservators have come is that a judicious deepening of the river by dredging will afford a safe and proper remedy

for the existing defects in the navigation, and they have in consequence commenced the needful works.

#### CHIPS.

The parish-church of Faceby, Cumberland, a structure bearing traces of Norman work, but utterly gone to decay, is to be rebuilt. The first stone has been laid.

A new Congregational Chapel at Barmouth was opened on the first Sunday in August. The structure has cost about £1,500.

All Saints Church, Stanford, was reopened on Sunday week, after restoration. Some additions to the structure are contemplated, when funds permit.

Old St. Martin's Church, Lincoln, has been purchased by the Bishop of Lincoln, that the materials of which it is composed may not be desecrated, but preserved till opportunity offers for the using of them in the building of the new church for the Canwick-road district.

Another new Board School was opened on Saturday afternoon in Bell-street, Edgware-road, by Lord Napier and Ettrick. The building will accommodate 816 children, and cost £16,000.

On Monday afternoon the foundation-stone of a new colliery chapel was laid at Shindcliffe, near Durham. Mr. James Love is the builder.

The National Schools at Wyvenhoe have just been enlarged, at a cost of £500. Mr. Chapman was the contractor.

A new Temperance League Hall is about to be erected in Liverpool, to accommodate about 4,000 people. The architects are T. E. Murray and G. H. Thomas.

A case of rattening has occurred at Stoke-on-Trent. Mr. R. Bagnall, a brick and tile manufacturer, it seems, had a dispute with his overmen, whose duty it is to finish the work, and who left. The makers were kept on, and early last Friday the cogs of the engine wheel were broken, rendering the engine useless, and throwing out of work a large number of hands.

The interior stonework of St. John's Church, Eton, having fallen into decay, it has been completely restored by Messrs. Wheeler, of Reading, under the superintendence of Mr. Ferrey, architect, of London. The expense has been borne by the College authorities.

The foundation-stone of a new Wesleyan Chapel was laid on Wednesday week at Woolcott Park, Bristol. The chapel will accommodate about 500 persons. The cost of the chapel, school, and land will be £3,000. The architect is Mr. Edward Potts, of Oldham, and Mr. W. E. Walters, builder, of Cotham.

Sir John Hawkshaw has sailed for Brazil, for the purpose of surveying a line of coast extending about 5,000 miles from Pernambuco. He will report as to eligible spots for the establishment of harbours and for the construction of railways.

The Act passed in the late session to consolidate and amend the laws relating to Building Societies, will come into operation on the 2nd of November, when the old statute of the 6th and 7th W. IV., c. 32, on Benefit Building Societies will be repealed. It contains 44 sections.

It is said that the Liverpool Gas Company will be held responsible for the recent destruction of the landing-stage.

A new (Roman) Catholic Chapel was opened last week at Ilfracombe. It holds 120 persons. Mr. Hansom was the architect, and Mr. James Vickery the builder.

The "taper stick" is the latest novelty for pious pilgrims across the Channel. To all appearances it consists of an ordinary-looking walking-stick, but on unscrewing the head out pops the statue of a saint, holding a lengthy taper in its hand, which, when lighted, will last long enough for a procession or a church service.

A new Church Club is spoken of. The capital is to be £60,000, and the club, which will be erected in the immediate vicinity of Charing Cross, is to accommodate no less than 1,600 members.

The National Schools, Wyvenhoe, have been enlarged to meet the requirements of the Education Department. Accommodation is provided for 153 additional children. The school was opened on last Thursday week, Mr. Chapman being the contractor.

It is stated that the Mersey Docks and Harbour Board have intimated to the Liverpool Gas Company that they hold the Company responsible for the destruction of the landing-stage by fire. The conflagration arose by the carelessness of the plumbers employed in joining the gaspipes below the stage.

#### CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHELIVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB AND SON  
Makers to the Bank of England,  
57, S. Paul's Church-yard, E.C.  
And 68, S. James' street, S.W.—(ADVT.) } London.



## The Timber Trade.

The following are the wholesale prices of timber, deals, &c.

Per 120 12ft. 1½ x 11in.

	£ s.	£ s.
United States pitch pine planks	14 0	15 10
Archangel 1st yellow	16 10	17 10
" 2nd	14 10	15 0
Prince Edward's Island spruce	10 0	
Petersburg 1st yellow	13 10	15 10
Wyburg 1st	13 10	14 10
Petersburg and Riga white	11 10	13 10
Quebec 1st bright	21 0	26 0
" 1st floated	20 0	23 0
" 2nd bright	15 0	17 0
" 2nd floated	15 0	15 10
" 3rd bright	12 10	13 10
" 3rd floated	12 10	13 0
" 1st spruce	13 0	13 10
" 2nd	10 10	11 10
" 3rd	10 10	10 15
St. John's	10 0	11 0
" battens	9 10	10 10

Per load of 50 cubic feet.

	s. d.	s. d.
Ironbark	170 0	220 0
Riga fir	80 0	85 0
Memel crown	90 0	110 0
" best middling	82 6	100 0
" good middling and 2nd.	75 0	90 0
" common middling	70 0	80 0
" undersized	55 0	65 0
Stettin fir	60 0	70 0
Swedish balks	40 0	55 0
Swedish fir	60 0	65 0
" small	40 0	55 0
Crown Memel oak	110 0	160 0
Brack	105 0	
Danzig and Stettin crown oak	110 0	160 0
Red pine masts	90 0	120 0
Yellow pine do., large	110 0	130 0
" waney board	110 0	130 0
" small	80 0	90 0
Pitch pine	75 0	85 0
Quebec oak	160 0	180 0
Rock Elm	150 0	160 0
Ash	140 0	160 0
Quebec large birch	110 0	160 0
St. John's birch	85 0	110 0
Red pine, mixed and building	70 0	80 0
" for yards and spars	90 0	130 0
Teak	220 0	280 0

Per cubic fathom.

	£ s.	£ s.
Petersburg lathwood	10 0	11 5
Riga, &c.,	8 0	9 0

Per foot run.

	d.	d.
Norway poles	2	3

Flooring, per square of 11n.

	s. d.	s. d.
Best yellow	14 6	17 6
" white	13 6	14 6
Second qualities	12 6	15 0

Staves per mille of pipe.

	£ s.	£ s.
Memel crown pipe	250 0	270 0
" brack	220 0	230 0
Canadian standard pipe	80 0	
" puncheon per 1200 pcs.	20 0	22 0
Bosnia single barrel	31 0	
United States pipe	50 0	72 10
" hoghead, hvy. & ex.	30 0	45 0
" slight	20 0	21 0

Per 18 feet cube.

	s. d.	s. d.
Riga crown logs	120 0	135 0
" brack	95 0	100 0
Memel crown	95 0	110 0
" brack	75 0	85 0

Per 40 feet 3 inch.

	s. d.	s. d.
Danzig crown deck deals	25 0	32 0
" brack	17 0	22 0

At each.

	s. d.	s. d.
Norway Rickers	0 10	1 2
Lancewood spars, fresh	6 0	9 0
" ordinary to fair	3 0	5 0

Per superficial foot.

	d.	d.
Honduras mahogany, cargo average	4	5
Mexican	4	5
Tabasco	5	6
Cuba	7	10
St. Domingo	7	10
" curls	12	24
Cuba cedar	4½	5
Honduras and Mexican cedar	3½	4½
Australian	3½	4½
Pencil	2	3½
Italian walnut	4½	5
Black Sea	3½	4½
Canadian	3	4
Bird's-eye maple	5	7
St. Domingo satin wood	12	18

Per ton.

	£ s.	£ s.
Bahama satin wood	7 0	9 0
Rio rosewood	14 0	20 0
Bahia	12 0	18 0
Puerto Cabello zebra wood	7 0	8 0
Ceylon ebony	12 0	18 0

	£ s.	£ s.
African billet do.	12 0	15 0
Lignum vitae, St. Domingo	6 0	10 0
Cuba cocus wood	5 0	7 0
Turkey boxwood	5 0	16 0

Masts per load of 50 cubic feet.

	s. d.	s. d.
Red pine	90 0	120 0
Large yellow pine	80 0	130 0
Oregon	180 0	240 0
Kawrie	160 0	220 0
Norway spars	40 0	60 0

## WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay. For samples and further particulars, apply to the MANAGER, at the Quarries Narberth-road, L.S.O.—[ADVT.]

## TENDERS.

DERBY.—For painters' work at the Town Hall. Mr. George Thompson, C.E., Corporation Surveyor.

	£ s.
Smith	249 0 0
Radford and Bassino	238 0 0
Webster	228 10 0
Cantrill	189 0 0
Skevington and Sons	188 0 0
Roe	148 0 0
Bloant	129 10 0
Kirkland	129 8 0

\* Accepted by the Corporation.

Surveyor's estimate £220.

DERBY.—For alterations to police office. Mr. George Thompson, C.E., Derby.

	£ s.
Morley	149 10 0
Riley	140 7 0
Slater	138 10 0

HARLECH.—For pipe sewer, manholes, and lamphole. Mr. Thomas Roberts, Engineer.

	£ s.
G. Williams	1290 0 0
Morris	115 0 0
Jones	115 0 0
Flughes	113 0 0
R. Williams (accepted)	84 0 0
Engineer's estimate	83 18 9

HAYDON, NEAR SWINDON.—For new schools and teachers' residence. Mr. Drew, of Highworth, architect.

	£ s.
Barrett	1,205 0 0
Foreshaw	1,025 0 0
Phillips	910 0 0
Thomas	867 0 0
Wiltshire (accepted)	864 10 0

IPSWICH.—For making good Benezet-street, for the Town Council.

	£ s.
Kerridge (accepted)	1125 0 0

LLANVERCHOR.—For new infants' school, for the Llanyverchoa Upper School Board. Mr. R. A. Lansdowne, architect, Newport, Mon.

	£ s.
Parfitt (accepted)	648 0 0

LLANELLY.—For schools. Messrs. Wilson, Willcox, and Wilson, architects, Bath.

Old Road Site.

	£ s.
Rowlands	2,638 15 0
Williams and Thomas	2,616 14 6
Jones and Allen (accepted)	2,227 0 0

Bigyn Site.

	£ s.
Rowlands (accepted)	1,604 19 8
Jones and Allen	1,763 0 0

NEWPORT, MON.—For alterations to shop and premises for Mr. H. Comley, Commercial-street. Mr. E. A. Lansdowne, architect. Quantities not supplied.

	£ s.
Prosser	536 0 0
J. Jones	525 0 0
C. Jones	521 0 0
Williams and Sons	509 0 0
Williams	485 0 0
Thomas	485 0 0
Miles	475 0 0
Wittaker	479 0 0
Linton (accepted)	462 0 0

PORTSWOOD.—For a police station. Mr. Lemon, architect.

	£ s.
Bostock	889 17 6
Stevens	877 0 0
Crook (accepted)	789 10 0
Laver and Rowland	964 13 0
Dyer	895 15 0
Martin and Son	925 0 0
Bull and Sons	897 0 0
Architect's estimate	£910.

ROCK FERRY.—For new Catholic Church. Mr. E. Welby Pugin, architect. Quantities supplied.

	£ s.
Hobson	28,400 0 0
Parnell and Son	8,100 0 0
Yates	8,000 0 0
Mullins	7,868 0 0
Haigh and Co.	7,300 0 0
Carpenter	7,200 0 0

SANDHURST.—For new Catholic schools. Mr. E. Welby Pugin, architect. Quantities supplied by Mr. R. O. Harris.

	£ s.
Canon (accepted)	£594 0 0

SNOW HILL.—For new warehouse, for Mr. Bolton. Messrs. John Young and Son, architects. Quantities by Mr. A. L. Buzzard.

	£ s.
Hill, Higgs, and Hill	23,970 0 0
Hart	8,856 0 0
Ashby and Horner	8,848 0 0
Conder	3,796 0 0
Lawrance	3,750 0 0
Prass	3,670 0 0

SOUTHAMPTON.—For iron pipes and castings for the town water supply. Mr. George Manwaring, Engineer.

For pipes. Special castings.

	£ s.
Jordan	27 17 6
Abbot and Co.	6 17 6
Elington and Sons	7 12 0
Laidlaw and Son	8 2 6
Jukes, Coulson, Stokes and Co.	7 9 6
Cochrane and Co.	7 12 6
Cochrane, Grove & Co.	8 5 0
Hollands (accepted)	7 10 0
Bull and Son	7 14 0
Engineer's estimate	7 5 0

\* With certain stipulations.

STOCKCROSS, NEWBURY.—For a workman's club, with cottage, &c., for Sir—Sutton, Bart. Mr. G. A. Barne, architect, Newbury. Quantities supplied.

	£ s.
Harrison	2899 0 0
Hitchman	893 0 0
Benham	874 0 0
Elliot (accepted)	798 0 0

STRETFORD.—For new Catholic schools, St. Ann's. Mr. E. Welby Pugin, architect. Quantities supplied by Mr. R. O. Harris.

	£ s.
Southern	£925 0 0
Herd	787 0 0
Cain	770 0 0
Ward (accepted)	700 0 0

WARRINGTON.—For new Catholic Church. Mr. E. Welby Pugin, architect. Quantities supplied.

For Nave and Aisles only, and exclusive of foundations

	£ s.
Mullins	£10,449 0 0
Thompson	10,330 0 0
Haigh and Co.	9,661 0 0
Parnell and Son	9,262 0 0
Breen	8,800 0 0
Middlehurst	8,750 0 0
Yates	8,415 0 0
Watkins	8,240 0 0
Wilson	8,204 0 0

\* Accepted, together with tender for chancel.

For Chancel and Side Chapel.

	£ s.
Yates (accepted)	1,700 0 0

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## COMPETITIONS OPEN.

ARLESEY, BEDFORDSHIRE, Sept. 30.—For plans for Board schools and master's residence. T. J. Hooper, Clerk to the School Board, County Court Office, Biggleswade.

CARDIFF.—The plans sent in competition for the Cardiff and County Club by Messrs. Wilson, Willcox, and Wilson, architects, of Bath, have been unanimously accepted.

CARDIFF, Sept. 29.—For designs for the proposed Free Library, Museum and Science and Art Schools. Mr. E. Payne, Hon. Sec., The Wharf, Cardiff.

HASTINGS, Sept. 24.—For designs for a new Town Hall, with police offices, lock-ups, public offices, &c. Premiums of £100, £50, and £25 will be given for the three most approved designs. Mr. G. Meadows, Town Clerk, 8, Bank-buildings, Hastings.

WONFORD HOUSE HOSPITAL FOR THE INSANE, NEAR EXETER, Aug. 31.—For designs and estimates for a chapel and kitchen. A Premium of £40 will be given for the most approved design. Dr. Lyle, Wonford House Hospital, Exeter.

Geometrical and Encaustic Tile Pavements in every variety. Over Sixty New Designs at 5s. 6d. per yard super.

"The Tiles are excellent, both in quality and colour."—BUILDING NEWS. "They are of great excellence in design—the material is not surpassed by any found in this kingdom."—Art Journal. "The patterns are remarkably good and effective."—Gardener's Magazine, &c., &c. Designs and sample Tiles free on application to HENRY C. WEBB, Tiles, Worcester. London House, 114, Victoria-street, Westminster. Mr. T. Pulling, Agent.—[ADVT.]

CONTRACTS OPEN FOR BUILDING ESTIMATES.

ACTON LOCAL BOARD, Aug. 25.—For the supply of 500 tons of ordinary broken blue Guernsey granite. E. Monson, C.E., Surveyor, High-street, Acton, W.

BATLEY, Aug. 24.—For a supply of sanitary tubes. J. A. Deane, Town Clerk, Batley.

BECKENHAM, Aug. 29.—For the construction of about 2,300 ft. of 3 ft. by 2 ft. sewer, and other works. Mr. A. Williams, C.E., 18, Great George-street, Westminster, S.W.

BIRSTAL LOCAL BOARD, Aug. 24.—For brickling and cementing the bottom of the new gasholder tank. Mr. G. Severs, Gasworks' Manager, Smithies, Birstal.

BISHOP'S STORTFORD, Aug. 28.—For the erection of the Thorley Board school. G. Perry, architect, Church School-room, Thorley.

BROXBORNE, Aug. 31.—For the execution of sewerage works. Mr. T. W. Grindley, C.E., 205, Gresham House, Old Broad-street, E.C.



**EAST ARDSLEY SCHOOL BOARD, Aug. 27.**—For the erection of a school, with master's house, boardroom, boundary walls, and outbuildings. Messrs. Holton and Connors, architects, Central Buildings, Dewsbury.

**HAY, BRECON, Aug. 24.**—For the erection of a police station and residence, with magistrate's room attached. Mr. D. Thomas, Clerk of the Peace, Shire Hall, Brecon.

**HEADINGLEY, LEEDS, Aug. 31.**—For the erection of 16 dwelling-houses and outbuildings, near Shaw-lane. Messrs. Hill and Swann, architects, Leeds.

**HEATON, NEAR BRADFORD, Aug. 28.**—For the erection of Airedale College. Messrs. Lockwood and Mawson, architects, Exchange, Bradford.

**HORNSEA LOCAL BOARD, Aug. 31.**—For the construction of brick and pipe sewers, settling pits, pilling and other works. C. F. Butler, Engineer to the Local Board, 10, Bowalley-lane, Hull.

**KILDARE, IRELAND, Aug. 25.**—For the erection of a new mansion at Palmerston. Mr. F. Hayatt, 77, Great Russell-street, London, W.C.

**KNARESBOROUGH CEMETERY, Sept. 3.**—For the erection of chapels, lodge, &c. Messrs. Robinson and Marshall, architects, Tyrrell-street, Bradford.

**LEEDS, Aug. 26.**—For alterations and additions to K R K House, Vicar-lane. Mr. S. E. Smith, architect, 39, Park-square, Leeds.

**LEEDS, Aug. 27.**—For the erection of 22 houses on the Hill Top Estate, and 22 houses on the New Wortley Estate. Mr. T. Ambler, architect, 9, Park place, Leeds.

**LEEDS, Aug. 31.**—For the erection of 3 houses, and shops and brewhouse in Roundhay-road. Messrs. Wilson and Bailey, architects, Central Market-buildings, Leeds.

**LEEDS SCHOOL BOARD, Aug. 24.**—For the erection of a new school at Rodley. Mr. W. Lee, Clerk to the Board, School Board Offices, Park-row, Leeds.

**MAIDA VALE, Aug. 31.**—For taking down and rebuilding No. 40, Maida Vale. H. M. Burton, Surveyor, 14, Spring-gardens, S.W.

**METROPOLITAN BOARD OF WORKS, Sept. 24.**—For the formation of carriage and footways in Wilderness-row. E. O. Sir J. W. Bazalet, C.B., Engineer to the Board Spring-gardens, S.W.

**MIDLAND RAILWAY, Sept. 1.**—For the supply and erection of ironwork for widening bridges. Engineer's Office, Midland Railway, Derby.

**MIDLAND RAILWAY, Sept. 1.**—For the erection of additional fitting shops, smithy, and other buildings, for the locomotive and carriage department at Derby. Engineer's office, Midland Railway, Derby.

**NORMANTON LOCAL BOARD, Aug. 31.**—For the excavating, puddling, brickwork, &c., required in constructing a reservoir at Marshall Hill. Mr. E. Lyman, C.E., Bask-street, Westgate, Wakefield.

**OTLEY, Aug. 31.**—For the erection of a court-room and offices adjoining the lock-up. Mr. B. Hartley, Surveyor, Pontefract.

**PHOSPHATE SEWAGE CO., Sept. 1.**—For alterations and additions to the present sewage works at Hertford. Mr. T. W. Grindle, C.E., 205, Gresham House, Old Broad-street, E.C.

**RAMSGATE, Aug. 31.**—For the erection of a new infant school in St. George's-road; and for additions and alterations to Christ Church Schools, Royal-road. Mr. Hodgson, High-street, Margate.

**SALISBURY, Aug. 26.**—For proposed additions to the Infirmary. Messrs. Williams and Taylor, surveyors, 12, Montague-street, Russell-square, W.C.

**SHEFFIELD, Aug. 31.**—For laying out Weston Park. Mr. P. B. Coghlan, Boro Surveyor's Office, Bower Spring, Sheffield.

**ST. PANCRAS, Aug. 25.**—For repairs to six houses in Clarendon-square. Mr. R. Parris, architect, 61, Kennington-road, S.E.

**ST. PANCRAS, Sept. 14.**—For painting and keeping in repair about 3,336 lamp columns, head irons, and lanterns. T. E. Gibb, Vestry Hall, Pancras-road, N.W.

**TADCASTER CEMETERY, Sept. 10.**—For erecting chapels, lodge, boundary walls, and laying out grounds. Messrs. Atkinson, architects, 12, Micklegate, York.

**TONGE-CHAM-ALBKINGTON, Aug. 27.**—For the erection of a school. Rev. J. Potter, The Vicarage, Tonge, near Middleton, Manchester.

**TRINITY HOUSE, Aug. 31.**—For alterations, additions, and repairs to the Naze Tower, near Walton-on-the-Naze. Trinity Buoy Store, Harwich.

**WOLVERHAMPTON, Aug. 31.**—For painting the exterior, and for painting and decorating the interior of the Town Hall. Borough Surveyor's Office, Town Hall, Wolverhampton.

#### BANKRUPTS.

(To Surrender in London.)

James Blake, Graham-road, Dalton, stonemason, Sept. 2, at 11.—John Tibbitt, jun., St. Peter's-road, Kingsland, builder and contractor, Sept. 10, at 11.

(To Surrender in the Country.)

Edward Lloyd, and James Statham, Liverpool, timber merchants, August 26, at Liverpool.—Joseph Thompson, Russell Town and Clifton, builder, August 31, at Bristol.

#### SITTINGS FOR PUBLIC EXAMINATION.

J. Thompson, Great College-street, Camden Town, builder and decorator, Nov. 7.—G. Thorneioe, Clement's-passage, Clement's-lane, Strand, engineer, Nov. 10.—H. B. Sheridan, George-street, Westminster, and Galway-road, Bayswater, contractor, Nov. 13.

#### DECLARATIONS OF DIVIDENDS.

H. Greenfield, Horsham, builder, div. 20s.—S. Metcalfe, Bradford, glass merchants, div. 2s. 6d.

#### SCOTCH SEQUESTRATION.

Robert Bunyan, Parkhead, near Glasgow, engineer, Aug. 21.

#### LATEST PRICES OF MATERIALS USED IN CONSTRUCTION.

(From the Public Ledger.)

	LEAD.		
Pig Foreign . . . . .	per ton	£20 0 0	£20 15 0
" English W.B. . . . .	"	22 15 0	23 0 0
" Lead Co. . . . .	"	22 5 0	22 15 0
" Other brands . . . . .	"	21 2 6	21 7 6
Sheet . . . . .	"	22 10 0	0 0 0
Shot, Patent . . . . .	"	26 0 0	0 0 0
Red or minium . . . . .	"	23 15 0	0 0 0
White Dry . . . . .	"	28 10 0	29 0 0
" ground in oil . . . . .	"	0 0 0	0 0 0

	IRON.		
Pig in Scotland, cash . . . . .	per ton	£4 8 6	£0 0 0
Welsh Bar, in London. . . . .	"	9 10 0	10 0 0
" Wales . . . . .	"	8 15 0	9 5 0
Staffordshire . . . . .	"	10 15 0	11 10 0
Rail, in Wales . . . . .	"	7 10 0	8 0 0
Sheets, single in London . . . . .	"	13 10 0	14 1 0
Hoops, first quality . . . . .	"	12 0 0	12 10 0
Nail Rod . . . . .	"	10 10 0	11 10 0
Swedish . . . . .	"	17 0 0	19 0 0

	COPPER.		
British—Cake & Ingot . . . . .	per ton	£83 0 0	£85 0 0
Best selected . . . . .	"	85 0 0	87 0 0
Sheet . . . . .	"	90 0 0	93 0 0
Bottoms . . . . .	"	94 0 0	96 0 0
Australian cake . . . . .	"	84 0 0	87 10 0
Spanish cake . . . . .	"	0 0 0	0 0 0
Chili Bars, cash . . . . .	"	75 10 0	80 0 0
" Refined ingot . . . . .	"	0 0 0	0 0 0
Yellow metal . . . . .	per lb.	0 0 7½	0 0 8½

	OILS &c.		
Seal, pale . . . . .	per tun.	£36 0 0	£36 10 0
Sperm headmatter . . . . .	"	98 0 0	0 0 0
Cod . . . . .	"	39 1 0	0 0 0
Whale, South Sea, pale . . . . .	"	29 0 0	0 0 0
Olive Gallipoli . . . . .	"	47 0 0	0 0 0
Cocanut, Cochila . . . . .	"	41 0 0	42 10 0
Palm, fine . . . . .	"	36 10 0	0 0 0
Linseed . . . . .	"	27 17 6	28 0 0
Rapeseed, English pale . . . . .	"	30 10 0	0 0 0
Cottonseed . . . . .	"	26 10 0	27 10 0

	TIMBER		
Teak . . . . .	load	£11 0 0	£14 0 0
Quebec, red pine . . . . .	"	3 10 0	6 10 0
" yellow pine . . . . .	"	4 0 0	6 10 0
" pitch pine . . . . .	"	3 15 0	6 5 0
Quebec oak, white . . . . .	"	8 0 0	9 0 0
" birch . . . . .	"	5 10 0	8 0 0
" elm . . . . .	"	7 10 0	8 0 0
" ash . . . . .	"	7 0 0	8 0 0
Dantzic oak . . . . .	"	5 0 0	8 0 0
" fir . . . . .	"	3 10 0	5 10 0
" undersized . . . . .	"	2 10 0	3 5 0
Riga . . . . .	"	4 0 0	4 5 0
Swedish . . . . .	"	2 10 0	3 5 0
Wainsoot, Riga . . . . .	"	4 15 0	6 15 0
Masts, Quebec red pine . . . . .	"	4 10 0	6 0 0
" yellow pine . . . . .	"	4 0 0	6 10 0
Oregon . . . . .	"	9 0 0	12 0 0
Lathwood, Dantzic fm. . . . .	"	8 0 0	9 0 0
St. Petersburg . . . . .	"	10 0 0	11 0 0
Deals per C., 12ft. by 3 by 9in . . . . .	"	£20 0 0	£26 0 0
Quebec Pine, 1st qual. . . . .	"	15 0 0	17 0 0
" 2nd do . . . . .	"	12 10 0	13 10 0
" 3rd do . . . . .	"	13 0 0	13 10 0
Canada Spruce, 1st . . . . .	"	10 10 0	11 10 0
" 2nd & 3rd . . . . .	"	10 0 0	11 0 0
New Brunswick . . . . .	"	14 10 0	17 10 0
Archangel, yellow . . . . .	"	13 10 0	15 10 0
St. Petersburg yellow . . . . .	"	10 10 0	14 10 0
Finland . . . . .	"	0 0 0	0 0 0
Memel and Dantzic . . . . .	"	11 0 0	13 0 0
Gothenburg, yellow . . . . .	"	10 0 0	11 10 0
Gefle yellow . . . . .	"	12 10 0	14 10 0
Christiania . . . . .	"	13 0 0	14 10 0
Other Norway . . . . .	"	11 10 0	13 0 0
Battens, all sorts . . . . .	"	9 10 0	11 10 0
Flooring Bds. sq. of lin. . . . .	"	0 14 6	0 17 6
first yellow . . . . .	"	0 13 6	0 14 6
" white . . . . .	"	0 12 6	0 15 0
second quality . . . . .	"	0 12 6	0 15 0

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## THE BUILDING NEWS.

LONDON, FRIDAY, AUGUST 28, 1874.

## ANCIENT MONUMENTS.—STONEHENGE.

A COMPLAINT is made that the extraordinary monument on Salisbury Plain is falling into decay, and a proposal follows of a society for its preservation. The most important of the triple blocks, it is said, has long been bending inwards, and is likely soon to fall, and others, of scarcely less interest, have already given way, and the suggestion goes so far as to plead for their restoration. Little is to be said as to the practical difficulties in the way. Whatever was determined to be done, either with the stones or the soil beneath them, could be done, unless modern engineering and science be shams; while, as to the questions of property involved, they are so many chimeras. The true point is that involved in Sir John Lubbock's Bill, rejected by Parliament last session, for the Preservation of Ancient Monuments. There are two principles, either of which, in all such and similar cases, may be applied: to protect these remains from deliberate and reckless violence; or to undertake that they shall survive, unscathed by the corrosions of time. The former appears a legitimate design to pursue; the latter, besides being not less hostile to true antiquarianism than the Vandals themselves, is an impossibility. This remark applies, indeed, to many others among our ancient monuments; but Stonehenge is a peculiar favourite of the English mind, and the reasons are not far to seek. In the first place, it is enveloped by a deeper religious and historical mystery than any other relic in the land—in the world, we might almost say. The Valley of the Nile is a book only a few pages of which remain unread; the Persepolitan inscriptions have been deciphered; the palaces of Babylon and Nineveh have given up their autobiographies, as have the Indian cavern-temples and the rocks of Sinai. But Etruria is still silent, and Stonehenge is without an utterance. Of the Etruscans, however, we know much; of the Druids, from themselves, nothing—not from a single graven letter; not from a solitary architectural outline, excepting one, of a conjectural origin, in France. Yet a library of learning has been devoted to the mystic and broken circle on Salisbury Plain, which, it is now insisted, shall be raised once more erect, and buttressed by the myrmidons of the modern contractor. Every influence and every tradition of the place forbids the idea. Stonehenge was built—if built at all—for solitude, in the heart of a desert; it is the marvel of monoliths, eclipsed by neither Egyptian nor by Mexican labour; the inner oval, with its huge granite and porphyry fragments, must represent a tremendous toil, or a most ingenious mechanism for bringing those foreign cubes, of enormous weight, from distant quarries; all the rest is of Wiltshire origin, squared and chiselled, it would seem, by human hands, though, in the course of centuries, deformed into so rude a chaos, and overgrown by so wild a vegetation, that it suggests rather the effects of some natural convulsion. And this is the monument which the Wiltshire archaeologists would scrape clean, and shore up, and provide with fresh foundations! First, possibly, it might be wise to ascertain who the builders were, and to what their mighty work was dedicated. It is utterly strange that we should have in our midst a structure—if so it may be called—which has been recognised by turns as a Tuscan shrine, a cluster of Danish altars, a scene of Druidical human sacrifices, an observatory for the practice of astronomy in the days of the Assyrian monarch Bel, and so

forth, thus giving us six different sets of founders without a trace of authentic evidence in favour of any. Is it for this reason that our archaeologists invite us to consecrate the beginning of a new epoch for Stonehenge, dating from the third quarter of the nineteenth century. They confess that no contemporary records of this or of any cognate moments, such as that of Kildare, are extant to assist them. To commence with, therefore, they fall back upon Merlin; failing him, they appeal to the Cymric Triads; not a single Roman or Greek geography throws a ray of light upon their investigations, or even upon the less mysterious standing stones of Stennis, in the Orkneys, to the Botallick circles near Penzance, in Cornwall, or to widen the area, the mystic images on Easter Islands. This, with the character of the construction, has been held as proof that Stonehenge must have come into existence subsequent to Roman times. Not a reason, beyond the merest guess is assigned for the theory, any more than for that which attempts to modernise the kindred circles at Avebury. To begin with, what could have been the purpose of the builders? And why did a Christian generation select the very centre of the old Odin and Wodin worship to erect altars the most heathen and barbarous of aspect that were ever designed in any region of the earth, Central America not excepted? Testimony equally light is relied upon to smooth away the perplexities which surround the curious relics at Stanton Drew, in Somersetshire; and those near Aylesford and Addington; and still less are any inferences to be drawn from the cromlech or dolmen of Germain-sur-Vienne, not far from Confolens, in the French district of Charente; for this is not in the rough trilithic Stonehenge form, but a mighty half-hewn slab, upheld by four columns, upon which the traces of a distinct and uniform architecture are visible. However, having got rid of the mythical era; having dismissed the Roman, and having bearded the Druids, nothing is more easy, and nothing is more romantic, than to conjure up the architects of the "great Arthurian period"—who, if they reared these monuments, never put their hands to anything else at all like them. Fifteen years ago it was announced that the question might be settled by excavations, which had been carried on to some extent; but nothing in support of the newest hypothesis has been discovered. We may, if we prefer it, assume that Aurelius Ambrosius piled up these stones in memory of certain Saxons slain in battle; but from what order of structures did he derive his inspiration? Nothing that existed abroad could have furnished him with even the baldest suggestion of a model—nothing in Greece, Rome, or Egypt; and even the funereal architecture of the Indian Buddhists can only be compared with that of Stonehenge by a flying-leap of the imagination over a world of dissimilarities and a wilderness of historical conjectures. It is a poetical thought, however, that our forefathers learned the art of burial from a race then utterly unknown in Europe, who never buried their dead at all, but burned them, scattering their ashes to the winds, or giving them to the waters. When a Druidical or pre-Druidical origin is claimed for Stonehenge, and pronounced impossible by the learned, it is embarrassing, when the probabilities on the Buddhist side are looked for, to find that the two classes of monuments are utterly unlike; that in the one there are stone mouldings and iron fastenings with obelisks and gates, altogether absent in the other; and that, in point of fact, the people inhabiting these islands were formerly, not Druids, but Buddhists. But this, after all, is not the main question, which is whether, taking Stonehenge for whatever it may be, we shall give it over to the amateur preservers and restorers? Now, assuming the antiquarian view to be the most important, there would be little gained by removing the signs or challenging the pro-

cesses of age, and creating a nineteenth-century second edition of Stonehenge, in lieu of the shattered half-circle that still stands, lonely and solemn, in the centre of Salisbury Plain. As they exist, fallen or erect, those ancient stones have a meaning, whether or not this meaning can be fathomed; but restored, superintended, taken into scientific custody, they would lose their genuine character as memorials of some indefinite and yet undeniable past, mingling with the sacred history of England in whatever epoch the archaeologists may choose to believe—an age of simple stone-worship, or one of elaborate dedications to the dead. So far as they may be kept intact from vulgar spoliation, from the autumnal cockneys who wander to and fro, with hammers in their pockets, like geologists, and who would chip a fragment from the holy sepulchre itself to enrich a Camberwell cabinet, by all means let the Wiltshire Association, the Lord of the Manor, or the Crown, restrain these paltry Goths; but on the other hand, it appears ridiculous to contemplate restoring the historical outlines of the Pyramids, of the Nile Temples, of the Inca fanes themselves. Time will do its work, notwithstanding a particular class of collectors will wash the blue mould from a bronze antique, or scrape the oaken panels in an Elizabethan banqueting hall. Efforts of a similar kind have been directed against the indisputably prehistoric fragments of Roll Rich and Boscawen, but their effect frightened the dissatisfied archaeologists for a time, though it did not deter Inigo Jones from publishing his plan of a "Restoration," or Webb from reconstructing the shrine—on paper—in the most approved modern Roman style, or Dr. John Smith from proposing to erect a colossal orrery on the spot. For these, and a thousand other, fancies have played round the venerable edifice "vulgarly called Stone-hang," or "hanging stone," as Dr. Charleton expresses himself. On the other hand, it is equally to be desired that unauthorised excavations shall not weaken the surface—not the most solid imaginable—on which these vast trilithons with their mute companions stand, and every endeavour should be made to protect them from such outrages as that which once temporarily displaced the Blarney Stone. Supposing, however, the local archaeologists to have their way, there are eight sets of triple stones, which, now grimly and fantastically bowed beneath their weight of age, would have to be underpinned and set upright, like ill-set headstones in a suburban cemetery. Others are leaning, half supported by others that have wholly fallen, all making a picture, a perspective of a dim epoch, into the secrets of which none have penetrated with success. But no arcana are safe where the genius of restoration has been kindled. Was not the roof of Notre Dame de Paris painted blue, and powdered with golden stars? that of Holyrood disgraced by the carrying out of a wretched imitation? while, all the time, volunteers were using an ancient mural sculpture in the neighbourhood of Chester as a rifle-butt? There was an Indian colonel who undertook to repair the fractured lintel which forms the most sublime addition to the original plan of one among the most magnificent of the Mysore Temples. There was an Italian architect who demonstrated by rule of thumb that the leaning tower of Pisa could be restored to the perpendicular—if ever it was perpendicular—with the aid of modern skill; and so, no doubt, if Germany were to surrender her Rhine castles for experiments in this fashion. Upon the same principle, congregations might be gathered within a renovated Melrose and a Tintern in its second youth; nor would the desecration be less than that which gave over Conway Castle to the mercy of railway engineers. We have a few artificial and a few natural monuments left. Not many years can elapse before the ultimate fate of both is determined. We have castles, monasteries, and a hundred other descriptions



of the noble and the splendid, the consecrated and the mysterious, belonging to the life and legends of a remote ancestry; yet, when Stonehenge is to be "restored," where will restoration, or, in other language, the second age of ruin, end?

#### HOSPITAL CONSTRUCTION.—IV.

##### ARRANGEMENT OF WARDS.

HAVING laid down in outline the general arrangement and distribution of the buildings comprising a hospital, as far as regards grouping and isolation of pavilions, facility of communication, kitchen and administrative departments and their connection, we are now in a better position to consider the Ward-plan as the keynote, or as the main element in the arrangement of a hospital. We have thus followed the process which the architect in designing a hospital would adopt when governed by site, rather than that of making the ward element the primary principle, and working therefrom; and a little thought will convince the reader that such a course is best in this case. A ward-plan is really a settled principle as far as outline is concerned: it is a simple parallelogram, and the architect is called upon to dispose and arrange this simple type in the most intelligent manner. Many recent hospitals of costly construction have failed in the application of correct principles; and we are told by Captain Galton and Dr. Sutherland, whose authority in such matters may be deemed indisputable, that in "almost every case the architect has failed somewhere;" and again, that "whilst the theory has been recognised in its perfection, in the practical application the architect has sinned grievously against sanitary principles." This is plain. Either sanitary science is merely an ideal refinement, and the medical profession expect too much, or architects are wilfully, or it may be absolutely, ignorant. Hospitals built since 1857, when the principles of correct construction were supposed to be known, exhibit, we are told "in the majority of instances errors committed by the architect in the application of well-known sanitary laws. In some notable instances the architect would appear rather to have desired to establish his reputation for aesthetic design than to rest it upon a close adherence to sound principles of construction." Such an opinion, at any rate, does not sustain the ability of the profession, and we fear, unless the special knowledge necessary for such buildings is not acquired more, architects will run the risk of another class of specialists, or the sanitary engineer, coming in and taking this valuable class of practice out of their hands. The first great principle the architect has to learn in this as in all other specific branches of his profession is economy. All useless expenditure in adornment or plan, or desire to get picturesque effect, should be carefully eschewed. Space should be confined to the wards and necessary corridors, &c., and all passage room, corridors, and staircase space greater than what is required for the actual wants of the hospital and communication is not only useless, but positively injurious and wasteful. It must be ever borne in mind that every wasted cubic foot of air-space adds to the expense and labour of the administration. Again, every superficial foot uselessly given, entails cleaning and supervision. If architects would just consider that mere space is not always usefully enclosed within a building, but that it may be positively harmful, and that the problem is how best to use space rather than how much or how little, and so as to make every cubic foot add to available health-giving air without stagnation,—they would begin to view specific construction of this kind in a more intelligent way. Let it then be a first principle that superficial area must be only just sufficient for the proper administration, and that the more we enlarge this area

the weaker must be the administration, or the more costly. Again, the fewer the rooms the better, as every useless room is a useless drain on the resources of a hospital. As regards accommodation, it is considered that for the site for a hospital, one acre per hundred beds should be the minimum.

Reviewing other instances of the general application of hospital principles, St. Thomas's Hospital has four floors of wards all in communication. The basements also are connected by the staircases and corridors. It is thought the low out-patients wards are too close, and prevent a free circulation of air to the adjoining corridors; and also, the greater evil of allowing the foul air to enter the wards. The water-closets of this department also are placed too close to corridor. Lifts are provided from basement to each landing; the chimneys are contained in iron tubes carried up through the wards containing the ventilating outlet shafts. In this hospital 600 beds are provided. Leeds Infirmary, by another leading architect, has similarly fallen short of the approved principles. It has five pavilions, three on one side, and two on the other, of a central court. There are two floors of wards. The administration, dispensary, &c., are in the basement, and the foul air thus must find its way through all the superimposed wards by the staircases. Circulation of air is also impeded by the covering to the central court, which is truly said to form a reservoir of stagnant air. The ward-plan, as we have observed, should be confined solely to the sick and other patients, and those appliances, as nurses' rooms, water-closets, sculleries, lavatories, baths, &c., required for their use. Now the first point to decide upon is the number of beds a ward should contain, and its dimensions. There are two classes of wards—one for military hospitals, where facility of inspection and discipline are required; and another class, where surgical and severe cases have to be treated. General opinion among the medical profession points to large wards in the former case, and for small wards for the latter kind of cases. Some recent military hospitals provide forty beds; in the Lariboisière hospital\* the wards contain thirty-two beds each; and Herbert Hospital, of which we gave a general block-plan, provides also thirty-two as the unit in its large wards. Taking this last hospital for a model of ward, and also for sanitary principles involved, we will give a description of the arrangements. The wards are placed end to end, and by this arrangement the officer can see sixty-four beds in one view through the glazed panels of doors, and a saving in superintendence is the result. As in military hospitals a considerable number of the cases are not serious ones, as every man indisposed goes into the hospital, large wards are necessary. For other kinds of hospital the architect should be governed by the actual wants of the building he is designing, and by the opinion of physicians and surgeons. Let us look at the sketch plan and see what principles have been observed. Taking one ward as the unit or type, we find (1) the wall space on both sides is entirely utilised for beds in pairs between the windows, or the total number is divisible by 4. No fireplaces are placed along the walls, the heating being by other arrangements; in this case two fire-grates are placed in the centre of each ward. (2) The windows are arranged opposite each other on both sides of ward, an end window being inserted in each ward. A single bed is thus placed in each of the four corners of the ward, all the others being on the dual system. (3) By the arrangement of the windows the currents of air do not create draughts across the beds but between them; the line of beds is also protected by the projecting walls at the ends. These opposite openings also create a direct through current and prevent stagnation of air. (4) The conveniences, w.c.'s, sinks,

baths, &c., form the extreme end of the ward, the angles being formed as square projections, with the centre ward window between. On referring to the plan we gave, it will be seen these conveniences form a kind of isolated chamber, with openings on both sides, so that currents of air can pass directly through them without entering the ward, whichever way the wind blows. Thus effluvia is completely shut off or escapes freely. This arrangement is at once convenient and efficient, though some recent hospitals have the closets and urinals at one side of the ward, to the detriment of the sick.

At the corridor end we have a small nurse's room and scullery, the former having an inspection window, the latter provided with sink and taps for immediate cleansing and other purposes. It is not recommended to provide cooking and dining rooms, as in some hospitals, as these require valuable room and greater labour. On the other angle of this end of the ward is the staircase. A lift may also be placed in the corridor. It will also be noticed the corridor, 12ft. wide, intervenes, and a central hall is carried up to the roof, and lighted and ventilated by large windows. It will thus be seen how simple a good ward plan is, and how easily a bad and imperfect one can be made by a complicated arrangement, or by trying to give too much in the space, a fault frequently seen in our hospitals, even those which have recently been built.

We have not space here to discuss the ward dimensions which are necessary. Of course this is regulated by the superficial area to be given to each bed.

#### THE BEAUTIFUL IN ART.—II.

AMONG the group of writers who hold the associative doctrine of Beauty, or that the qualities we term beautiful affect us by the pleasing emotions they awaken, may be ranked Jeffrey, Dugald Stewart, and one or two others. Locke, in his famous "Essay on the Understanding" shows innate principles to be futile, and that all our knowledge and ideas arise from *sense and reflection*. Upon this basis his ideas of taste are founded, thus according with our latest philosophers who have discussed the subject. Of all modern writers on Beauty, Ruskin holds a conspicuous place. His powers as a persuasive writer, combined with the power, originality, and enthusiasm of the artist, have enlisted for him a very large class of artists and writers on art. He at once exalts art into a kind of religion. He contends for intrinsic and even exclusive beauty in form, such as curvature, while the curve is itself the type of infinity. He says association operates more in adding force to conscience than in sense of beauty, and while he contests Alison's theory, he yet falls into similar reasoning without being aware of the coincidence. His theory, indeed, savours of the lofty ideality of Plato, no less than the asceticism of the Middle Ages.

Let us briefly examine his theory. Of "Typical Beauty," as opposed to "Vital Beauty," he speaks of the leading attributes as Infinity, Unity, Repose, Symmetry, Purity, Moderation; while to "Vital Beauty" he superadds all the considerations relative to function or adaptation. Deity is linked to each of these attributes; thus we have the Divine Incomprehensibility shadowed forth in *Infinity*, the Divine Comprehensiveness in *Unity*, Permanence in *Repose*, Divine Justice in *Symmetry*, Purity in Divine Energy, and Moderation in Government. All this is strictly Platonic in idea. The senses of sight and hearing are acknowledged as æsthetic in character. He speaks of the "unselfishness" of sight in its pleasures, its "spirituality" and purity, and he thus connects certain pleasing emotions to these senses. Again, the gradation of shades and colours constitutes their infinity. Bain observes the general tendency of Ruskin's speculations on art "is towards a

\* The Lariboisière Hospital we illustrated, with other French examples, in the BUILDING NEWS, Vol. XVI., p. 12.



severe asceticism, a kind of moral code, for which his only conceivable justification is the tendency of art to cultivate pleasure free from taint of rivalry and selfishness. To make this object perfect, no work of art should ever inspire even ideal longings for sensual or monopolist pleasures: an elevation both *impossible* and futile. Where to draw the line between the interesting and the elevated in above meaning must be matter of opinion." We refer our readers to Ruskin's "Modern Painters," Vol. II., for this writer's opinion on Beauty. In his "Seven Lamps of Architecture," in the "Lamp of Truth," he also alludes to the subject and the action of the imagination. Speaking of deception in art, he says "the action of imagination is a voluntary summoning of the conception of things absent or impossible, and the pleasure and nobility of the imagination partly consists in its knowledge and contemplation of them as such, i.e., in the knowledge of their actual absence or impossibility at the moment of their apparent presence or reality. When the imagination deceives it becomes madness. It is a noble faculty so long as it confesses its own ideality; when it ceases to confess this, it is insanity." This quotation shows a lofty conception of art, and throughout his works a high moral sense pervades his conceptions of all beauty. He thus places great stress on truthfulness in art, which we are constrained to admire. Again, he says: "The withdrawal of conscientiousness from among the faculties concerned with art, while it has destroyed the arts themselves, has also rendered nugatory the evidence which otherwise they might have presented respecting the character of the respective nations among whom they have been cultivated; otherwise it might appear strange that a nation so distinguished for its general uprightness and faith as the English should admit in their architecture more of pretence, concealment, and deceit, than any other of this or past time." Conscience and truth, then, are the touchstone to which all the beautiful in art is brought. No monopolist pleasure is conceived in their creation. He is truly transcendental when he speaks thus:—"Be so much of a Jew as to believe there is a Great Spirit who makes the tempests His true messengers—and you will paint the cloud, and the fire and the wave, better than in any state of modern enlightenment as to the composition of caloric or protoxide of hydrogen." Here we have in essence Ruskin's views of what true art is. There is a true ring about them: everything is to be tested by sincerity. We will allude to his opinions concerning art in another article.

Let us now turn to another writer on the subject. We refer to Professor Bain, who, in his great and thoughtful work on Mental and Moral Science, thus lays down the æsthetic emotions. He says they are a class of pleasurable emotions sought to be gratified by the compositions of fine art, and he thinks that the perplexity involved in the question of the Beautiful ought to be unravelled in such compositions. The productions of fine art, he says, appear to be distinguished by these characteristics. (1) They have pleasure for their immediate end. (2) They have no disagreeable accompaniments. (3) Their enjoyment is not restricted to one or a few persons. A picture, a statue, a fine melody or poem, are all social, and draw men together in mutual sympathy. These compositions, he says, are exempt from the fatal taint of rivalry and contest attaching to other agreeables, and in æsthetic compositions the enjoyment is general.

The eye and ear are the æsthetic senses; the other senses are gross, their sensations cannot be multiplied or extended like effects of light and sound. "Muscular and sensual elements can be brought into art by being presented in the *idea*." Again, "art is in spirit, and in its proper province, allied to morality, being almost identified with the persuasive part of morality." Bain further says the source of beauty is not to be sought in any "single

quality, but in a *circle of effects*." The search after some common property called beautiful has been abandoned, and plurality of causes admitted.

Among terms used to express the æsthetic qualities are several synonyms, but a real distinction, says Bain, is marked by the names of Sublimity, Beauty, and the Ludicrous. Beauty is the most comprehensive of these, and the characteristics of fine art chiefly attach to it. The objects so described by these terms may occur spontaneously, as in wild scenery; or may incidentally spring up, as when a structure designed for pure utility rises to grandeur from its mere magnitude; or they may be expressly produced for their own sake, as in a class of fine art or a profession of artists. Thus, the objects and emotions of fine art may be summarised, says Bain, as—

1. Simple sensations of ear and eye, a view maintained by Knight in his "Essay on Taste," and opposed by Jeffrey, who denies intrinsic pleasures.

2. Intellect, co-operating with the senses, furnishes materials of art; thus the monopolist senses, when presented in idea by the artist, are pleasurable. Thus also suggestions of health, and vigour, although sensual and exclusive, are, in their idea, artistic. Sensations of coolness or warmth may be suggested, and are pleasurable in poetry or painting. Hence, sensual pleasures may be deprived of their disagreeable adjuncts by the intervention of language or device and made artistic; and hence the satisfaction of mere sense should be the basis of the æsthetic emotions.

These are the general propositions laid down by Bain, who illustrates them, and we may profitably return to those views which bear upon art and architecture.

#### FRENCH PRESERVATION OF TIMBER FROM DECAY.

A DIRECTOR of the French Dockyards, and Inspector of Timber for Naval Purposes, and an Officer of the Legion of Honour, ought to have something to say about the preservation of wood which is worth listening to. It appears that it is a fact established by the agricultural statistics of France that the annual consumption of wood in that country considerably exceeds the reproduction, and consequently its preservation for building purposes has now become a question of the very first importance. In short, by the continued impoverishment of the land in that particular, not only are the interests of the agricultural and industrial population immediately affected, but their future requirements compromised and endangered. Very few persons have even an approximate idea of the enormous consumption of timber which takes place annually in France. It is generally believed that the shipbuilders are the principal consumers, and this would be true, to a certain extent, if it only related to timber of extraordinary or unusual dimensions, but as regards quantity, the consumption for shipping is almost insignificant. M. Burat, Professor of Commercial Statistics in the Institution of Arts and Sciences, does not hesitate to estimate the annual consumption of timber in France in building and manufactures at 353,166,000 cubic feet, to which must be added, 1,059,498,000 cubic feet for firewood, and 529,749,000 cubic feet made into charcoal.

It has long been known that France is in a bad way so far as timber is concerned, and the scarcity of coal, and the consequent use of timber for firewood, completely shuts her out from supplying England with wood which she might do in course of years. For their own sakes it is to be regretted that the landlords object to having timber round their fields, and to replacing the timber they cut down. No one (who quite understands the timber trade) wants that agricultural lands should be taken from the plough to turn into forest lands, but a judicious cultivation of what may

be called "building trees" will always pay, and not impoverish the corn or other cereal power production of the estate. M. De Lapparent, aware of the scarcity, naturally seeks a remedy in making timber more durable by artificial means. Immersion in water is no doubt a beneficial process for timber to undergo, but how long should it remain under water in order to get rid of its sap, or of as much of it as possible? Evelyn says that a fortnight in river water is sufficient. M. De Lapparent recommends one year in river water; two years in fresh water frequently changed; and three years in brackish water, which should always be changing.

At the close of these several periods, the boards intended for planking should be taken out to be put in store, or they might be left to season themselves naturally for two years at least before being worked up. As to the rough ribs, seasoning in store would be totally sufficient, and it would require, after shaping but before putting together, to subject it to an artificial seasoning. There have been many plans of this description in use for some time in France and England, but they have only been applied to wood of moderate thickness, such as boards, flooring, and wainscoting. The plan adopted in London is the injection by means of a ventilator of hot air into the drying stove where the wood is placed; by this the temperature is gradually and gently raised until it reaches boiling heat. But as wood is one of the worst known conductors of caloric, if this plan is applied to large logs, the interior fibres will retain their original bulk, while those near the surface have a tendency to shrink, the consequence of which would be cracks and splits of more or less depth.

M. Guibert, of Tourville, near Cherbourg, has taken out a patent which consists of filling the drying stove with smoke produced by the distillation of certain combustible matters, such as sawdust, waste tan, smith's coal, &c. By means of a ventilator ingeniously arranged, a rotatory movement round the logs is given to the smoke, so as to obtain an average uniform temperature in every part. By this plan, as the distillation of combustibles is always attended with a considerable discharge of steam, all cracks and splits appear to be prevented. In this factory, the author referred to has seen a great number of boards prepared by this method, and all perfectly sound.

Messrs. Lége and Fleury Pironnet have invented an apparatus for the injection of sulphate of copper into beech and poplar. If the wood is only required to be seasoned, a warm current of air is substituted for the liquid, and without doubt this process of seasoning would be the quickest, and we should avoid the cracks and splinters always produced when dry and hot air only are applied. The great cost of the apparatus, and its complicated details, are, however, a drawback.

Charring timber is an excellent mode of preservation, and M. Lapparent has an apparatus for this object by the use of gas. The results obtained from experiments at the gasometer at Cherbourg, with the aid of a meter, and using a jet of average force, were:—1st. Consumption of gas about 200 litres per square metre, or 200 gallons per 10 square feet of carbonised surface. 2nd. Workman's average day's work of 10 hours would carbonise 440 square feet. 3rd. One workman is sufficient for bellows supplying two jets of gas. At full work the expense would not exceed 1½d. per 10 square feet. The operation can be facilitated by smearing, in the first instance, the surface of the timber with a little tar, and with the following advantages:—1st. The carbonisation of the cracks is facilitated. 2nd. It prevents the timber being too suddenly affected by the heat of the gas, which causes it to split. 3rd. It prevents the cracking and splintering off of little ignited particles. Without going to the length of saying that any means of producing indestructible timber



are here propounded, still there is something worth remembering in every line. If the results of recent experiments in this country are confirmed, we shall be in a far better position than our French neighbours, and it is to be sincerely hoped that the results will be proved to be established facts, for it will effect a revolution in the building trade, provided the process is inexpensive. In the meantime, and with the recent experience of disasters occasioned by the inflammability of timber and other causes, any contribution which tends to throw any light at all on the means to be pursued towards its preservation is very welcome.

### THE ECCLESIASTICAL ARCHITECTURE OF SCOTLAND.\*

THE antiquities of Scotland have been less explored than other remains of the United Kingdom. Works on English and Irish Archaeology are profuse and voluminous, yet, strange to say, the architectural remains of Scotland have been but scantily touched upon, the only illustrated work of any pretension to correctness we know of being the beautifully engraved work by R. W. Billings, on the "Baronial and Ecclesiastical Antiquities of Scotland." This lack of interest on the part of the Scotch in the beautiful remains which are scattered over their wild and rugged country, and which enhance its very grandeur and beauty, must be attributed perhaps to that temper of mind so eminently characteristic of Scotland, which has ever regarded the reliques of the past as vestiges rather of religious superstition than of beauty. It has been left to English archaeologists to fill up this gap, and we are glad to find so able and correct an archaeologist as the Rev. Mackenzie Walcott supplying the desideratum in our antiquarian literature. Mr. Walcott says his purpose has been to produce a work which should hold a middle place between the conciseness of Tanner's "Notitia" or Archdall's "Monasticon Hibernicum," and the diffuseness of Dugdale. The present work is divided into four parts, for the sake of distinctness and reference. These parts are—

1. Historical, reaching the seventeenth century, when ecclesiastical art became extinct;
2. Architectural, embracing dates and examples;
3. Legendary, or the folk-lore and traditions of these institutions;
4. Descriptive accounts of buildings, lists of members and other statistics.

A less bigoted feeling against these ancient monuments of the land has succeeded to ruthless spoliation, and a school of native antiquaries has grown up; among them Cosmo Innes, Hill, the Laings, Wilson, Muir, Robertson, and others, the Bannatyne, Spalding, and Maitland Clubs helping onwards this spirit by the publication of monastic and other records. Historically, Mr. Walcott traces the religious life of Scotland from the arrival of St. Rule (Regulus) and his Greek brethren from Patras, through the manifold vicissitudes of the Church during succeeding centuries, to the founding of the school of St. Columba, and the Culdee colleges; the foundation of Melrose, Dunkeld, the earlier missions, and the development of the monastic orders and cathedral establishments, and the final decay of the ecclesiastical system, ushered in, as usual, by the laxity and disorganisation of the hierarchy. In 1560, according to Spotiswood, "An Act was passed for demolishing cloisters and abbey churches, such as were not as yet pulled down." Thereupon a wanton destruction commenced, under zealous and rabid nobles. Mr. Walcott alludes to the difference of the fate of the churches of Scotland and England. In England, creeds and formularies, gradations and ranks of clergy, were maintained after the dissolution; while

in Scotland everything in the shape of ritual and sanctity died out; and a severe form of Judaic religion supplanted the Episcopate. The æsthetic revival has somewhat toned this spirit, however. Heavy pews and galleries have been cleared, windows glow with coloured light, the organ has resumed its speech. Mr. Walcott's book will commend itself to all archaeologists and antiquaries; he writes more for them, and as one of them, than for architects, though we may profitably glean some interesting facts from the accumulated mass of learning and research he has brought to bear upon the architectural remains of Caledonia.

The labours of Rickman, Billings, and others were confined to architectural subjects, but here Mr. Walcott, impressed with the want of a comprehensive volume embracing classified accounts of every cathedral, monastery, college, and hospital, has combined the several characteristics of those works. We have cathedrals alphabetically arranged, monasteries classed as to their orders, and churches placed under their respective dioceses. Bishops and abbots are also enumerated, and the archaeologist or general student can readily turn to the particular subject he wants. It appears difficulties of identification as regards names of places have been numerous; for instance, we have various kinds of synonyms for Jedburgh, Kelso, &c., which perplexities of spelling have rendered the distribution of the dioceses under archdeacons and deaneries, and the dedications of parish churches, here first attempted, quite a Herculean task.

The descriptions of the buildings we could have wished more detailed and critical, but as we have said, Mr. Walcott does not write so much for architects as for antiquaries and general readers. The resemblances between contemporaneous remains on both sides of the border are pointed out, and the Irish type of round tower, with other affinities to the churches of the sister isle, are mentioned. Continental, and especially French, influence is noticed in some southern examples, which indicate the employment of French, Spanish, and Flemish architects north of the Tweed. Thus the eastern transept of Glasgow, with its four altars, had its counterpart in the seven altars at Peterborough, or the five at Hexham or Glastonbury; thus also we have the round church of Orphir paralleled at Altenfurt, Druggette, and Grasse, and the west front of Valle Crucis at Dunblane. Of the Norman existing examples, we have the Round Tower of Brechin, the lower stories of Dunblane Tower, the nave of Dunfermline, with its fine west door (1150), lower portions of towers at Elgin; also Jedburgh, Kelso (begun 1128), the Presbytery of Kirkwall (where also is observable traces of mural colour as at Bristol and Worcester), St. Andrew's, tower of Rule, and others. Of the Early English, we have Arbroath, Dryburgh, Dunblane, Dundee, Dunkeld, Elgin, Glasgow, Holyrood, Jedburgh, Kirkwall, all containing more or less; while of the Decorated or Flamboyant there are Aberdeen, Dundee, St. Mary's, Dunblane, Dunkeld, Dryburgh, Elgin, Glasgow Cathedral, Holyrood, and Jedburgh, Melrose, Paisley, and St. John's, Perth, affording beautiful fragments. Many of these examples show some remarkable instances of beauty and variety we fail to discover in contemporary buildings further south; indeed, Scottish Mediæval architecture has been, we think, sadly neglected for Continental types of a very questionable purity. In the Decorated there is a stronger attachment to earlier forms than we see southwards: for example, we find the retention of the round arch; the shafts and capitals are plain, round or octagonal often; the corbelled angle-turrets, machicolate parapets, saddle-back towers, as Pluscardine, Kirkwall, Dunblane show a feeling for the massive and sublimer elements of art.

Secular cathedrals had no cloisters; the

chapter-houses are in abnormal positions, standing on the north side of the church, as at Glasgow. Again, the eastern aisle to transept is found in several Cistercian churches, as Dundrennan, Melrose, Sweetheart, Arbroath, Elgin, &c., a fact which does not seem to agree with Mr. Sharpe's investigations of Cistercian buildings. The chapels to the aisles at Elgin, Melrose, and St. Giles are Continental features, and are compared with Chichester, the latter example with Manchester; while at Dunblane, Dunkeld, New Paisley, &c., we have aisleless choirs. Glasgow, we are told, has the only instance of a crypt. Towers were on the north-west angles, or placed at west end, as at Elgin and Aberdeen. Corby steps often take the place of battlements, and in some towers, as at Kirkwall, the corbelled turrets at angles give a picturesque and baronial look to many churches. Exquisite instances of window tracery occur, exhibiting the gradual changes it underwent from the lancets, included within round arches, to the pear-shaped loops and foliations at Melrose, the net pattern seen at Dunkeld, and the cusped marigold of late Decorated work, all beautiful variations from English types. We will return to the book and give a few other of the many interesting facts brought before us.

The Collegiate Churches usually have a cruciform plan, with central or western tower, south-west porch, sacristy on the north side, and often an apsidal or chevet termination. Roslyn chapel upon the north bank of the Esk, most beautifully surrounded by wooded hills, is a notable example in which Spanish influence is seen. It is 69ft. 5in. by 35ft., and 40ft. high, of eight bays, with a transverse eastern aisle. Its nave and transept were never completed. The choir is 48ft. 4in. by 17ft. The chapel was completed about 1490, and is noted for its "Prentice" pillar, associated with which there is a curious legend that it was the work of a 'prentice in the absence of his master, who had gone to Rome to make the model, and who, returning, struck with envy at his apprentice's completion of the pillar, struck the ill-fated youth his death-blow. It has been also called the "Prince's pillar," and there is some haziness about the actual designation. The detail and ornament are Moorish in character, and more exuberant than beautiful. The vault is tunnel-shaped, with transverse ribs only, and the St. Mary's Kirk, Edinburgh, St. Giles, Holy Trinity, Edinburgh (destroyed in 1845), Dalkeith, Aberdeen (King's College), are other examples. The last Gothic church built was Dairsie (1621). Coming to the cathedral churches, we have a deal of erudition, and some interesting ground-plans, which latter, however, are merely outlines, and are devoid of that amount of correctness and detail an architect expects to find. Copious lists of ornaments and vestments are given, more entertaining to the curiosity-hunter than practically useful; while we think the lists of bishops, deans, canons, præcentors, chancellors, and others, might have been given in an appendix, or printed in smaller type, as they at present confuse and bewilder the reader, and disconnect the text.

The engravings of this portion, by T. Allom are good specimens, though, being general views, are more interesting to ordinary readers. Of St. Andrew's, the "Canterbury of Scotland," only a fragment remains, and a general restored plan is given, showing it to have been a fine edifice, with nave of twelve bays, 200ft. by 62ft., with transept 160ft. long and east aisle, a choir of five bays, the total length being 358ft. "about 8ft. longer than Chester." Transitional Norman and Early English are the prevailing styles. On the south side, we have the "cloister garth," surrounded by the Chapter house, calefactory, and dormitory over; refectory on the south side, and the lay brothers' rooms on the west side. A plan of Aberdeen restored shows a nave of seven bays, 126ft. by 67ft. 6in., or 16ft. longer than Wimborne Minster. Grey granite is the

\* "The Ancient Church of Scotland: a History of the Cathedrals, Conventual Foundations, and Collegiate Churches, &c." By MACKENZIE E. C. WALCOTT, B.D., F.S.A. London: Virtue, Spalding, and Dalry.



material. The Cathedral was erected between 1272 and 1377. Elgin Cathedral, the finest north of the Tweed, has been called "the mirror of the land." It was dedicated in 1224. It underwent many plunders and fires, its central tower fell twice, and it was desolated in 1568; only the west front, choir, and towers remain. Its style was Early English (Transitional). The plan is cruciform, though the transepts very slightly project; the length 282ft. and width 35ft. with two western towers besides the central. The deeply-recessed double portal is a fine example. Of Decorated buildings, Fortrose Cathedral, of red sandstone is considered a gem for finish and elaborate mouldings. Little more than a roofless aisle exists.

Of other beautiful Cathedrals, there are Dunblane and Dunkeld. The former, with its simple yet noble, lofty, west triplet and portal, though almost a ruin, is one of the most beautiful Early Decorated buildings in Scotland. Its length is 216ft. breadth 76ft. and height 58. The tower occupies the south wing of transept and has corbelled turrets and a polygonal spirelet. We are sorry Mr. Walcott has not given us more detail of these examples. We have not space to enter into the chapter on Conventual churches, as Arbroath, Kelso, Holyrood, Balmerino and its curious central line of pillars; and the other great abbeys of Jedburgh, Dryburgh, and Melrose on the Border. Speaking of the normal plan of a conventual cloister, which we have lately had occasion to notice, Mr. Walcott appears to coincide with Mr. Sharpe in placing the rooms of the lay brethren or converts on the west side, cellars being underneath. Space forbids our entering into details. The chapter on legendary lore is replete with matters more curious than useful, and the work of Mr. Walcott, embodying as it does great and varied reading, will at any rate become an interesting contribution towards the annals of Scottish archæology.

#### SOME NOTES OF A MONTH IN NORMANDY.—I.

**D**IEPPE, Rouen, Mantes, Evreux, Lisieux, Caen, Bayeux, St. Lô, and Coutances, are towns I have lately visited, and it may be questioned whether there is any other equally extensive tract of country in the same latitude where the habits and homes of the people are more uniformly dirty, where the land is more consistently neglected, and where travellers are so incontinently surcharged. Sometimes you have the rare fortune to enter an hotel that has just undergone or is undergoing the process of refurbishing—in such cases, and in such cases only, can you rely with certainty on the absolute cleanliness of your apartments. But, as a rule, dirt and decay dominate over everything. The villages and small towns (as, for example, Conches) are quite on a par with the dilapidated wretchedness of the worst specimens in Ireland. Here and there, as in the country just named, you meet with pleasant surprises, pure exceptions to the rule. Such, for instance, is Beaumont-le-Roger, between Evreux and Lisieux, where you can get better coffee than at any of the so-called first-class hotels of Normandy at less than a quarter the price, and where, though appearances are simple and primitive, good rooms, country fare, undiluted cyder, and cleanliness are provided at five francs a day. More developed in its cookery, but no whit cleaner, is the White Horse at St. Lô, a capital and reasonable hotel, where everything the host can do to oblige is done with alacrity. Commend me to his table-d'hôte, and his Curagoa is a pleasant remembrance. In Caen, too, one can get really good dinners. But at such towns as Lisieux and Bayeux, where I particularly wished to stay for the sake of the antiquities, the accommodation is either very dilapidated or very costly. If a man (unencumbered) can

drink ditchwater for coffee, and take his meals in a place as gloomy as a charnel house, he may manage to exist in Lisieux for a day; after that he must resign himself to a system of slow poisoning, and is fortunate if, after a week, he has vitality enough left to reach the next halting-place in his journey.

ROUEN, as a town, is still essentially mediæval, in spite of its modern quays, new streets, and iron spire. Of its multitude of old narrow ways, there is scarcely one that has not a good morning's lesson for the young student. Of late work especially noteworthy are the delicately-moulded beams, &c., of the Flamboyant houses, and the exquisitely-carved Renaissance work at St. Vincent's, as also that of the restored house at the back of the tower of Jean D'Arc. Most of the churches, too, are yet to be seen, although not a few of them are in some sort of disguise. That of St. Laurent is turned into a foul, dark stable, as is also the church of St. George. St. Vincent, besides its Renaissance wood carving in the south chapel, has all the internal characteristics of the great churches on a smaller scale, and is thus perhaps a better study, because more easily get-at-able. I cannot help thinking, however, that the mullioned and traceried triforium, cut up into openings half the width of the lights in the clerestory window above it, is not the kind of thing to dwell too long upon; for while, to my mind, it appears both costly and weak, it nevertheless exercises an undoubted fascination very pleasant to experience, if we do not give too much time and trouble to it.

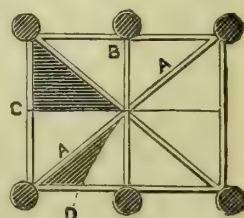
The great church of St. Ouen and the Cathedral are too well known by photograph and otherwise for them to be fit subjects for my notes; and yet it is hardly possible for me to leave the latter without adding my contribution of praise to the unfinished north-western tower (Saint-Romain), perhaps the plainest piece of architecture in all Rouen, and yet to me the grandest in its mass, the most refined in its proportions, and the most lovely in its detail of moulded and carved work. The Cathedral, although so much shut in by narrow streets and tall houses, is far more interesting to the student than the show-church of St. Ouen; and when added to this the visitor finds the custodians of the Cathedral more than civil, and those at St. Ouen more than obstructive, it is pleasant to reflect that the grand thirteenth-century church, with its twelfth-century heritage, is in every respect more worthy of regard than the more elaborated and bedecked abbey church of 1318-1518.

Of timber houses Rouen is still well supplied. In the Rue de la Viconté there are two or three good fronts—one especially good is divided into five bays, the main-posts covered with delicate tracery and pinnacles. Higher up the street, at the corner of the Rue aux Ours, is a very refined, though much-battered, example. One of the best-preserved houses is that at the corner of the Rue de la Tuile. That at the angle formed by the Rue Nationale and Rue aux Ours is fine and well preserved; but perhaps the most complete of unrestored work is that at the corner of the Rue Malpau and the Rue Tuvache, illustrated by M. Viollet-le-Duc in his "Dictionnaire," Vol. VI., p. 267. Of old, almost untouched, shops, the best are Nos. 7 and 9, Rue Pierre Corneille. Here the overhanging moulded beam of the house is above the series of small openings which give light to the interior when the shutters are closed; but these small openings form no part of the shop-window or door, which are divided from them by a deep lintel with projecting weather mouldings. Besides the restored Renaissance house already mentioned, there exists a rather tottering, but very beautifully-proportioned and delicately-treated front of the same style at No. 146, Rue de la Grosse Horloge—a street, by the way, that has no very extensive or superior specimens to show us, but one that somehow overflows with an indefinable charm—a place where we

rest as we walk, although it may be after many hours' exertion.

One feature in which Lisieux is particularly rich is here of scarcely any importance. The dormer or *lucarne*, I need hardly say, was a very great favourite with many architects in the fifteenth and sixteenth centuries. With Mr. Norman Shaw, and one or two others, it has influence enough to make its picturesque-ness felt even in these days; but the great majority of modern dormers are miserable-looking, weak, roof excrescences, as worthless for any practical value they are to the interior as for any architectural or picturesque character they give to the exterior. Of small dormers, one of the most piquant and most effective I have ever seen is to be found at No. 16, Place de la Basse. The roof overhangs considerably. The barge-board is moulded immediately under the tiles, and is then trefoliated under a semicircle, with the spandrels between them pierced. The wallplates are carried out to receive the barge, and are supported by perfectly plain curved brackets. Within these projections a moulded tiepiece rests on the wall plates, and half cut into and half under this occurs a single pointed arch scarcely removed from the semicircle, while the space above the tiepiece is filled in with timber framing of proportionately large scantlings. Small as it is, this little window possesses nearly all the qualities of great and good work; its lights and shades are broad; intensified and concentrated round about its decorative features—the trefoliation of the barge-board, and the three short lengths of simple mouldings. It may seem to some strange that I should pass by the famed structures of Rouen to note at such length a little dormer nearly at the top of a high roof in a low quarter of the town. I do so for the very simple reason that, in its way and its degree, it affected me more than did the grand piles for which the town is so celebrated. I studied it for more than an hour, partly by my unaided eyes and partly by the help of a powerful opera-glass, and I made a sketch of it as well as I could. There is still much for me to learn from it, for the power of this little thing lingers in my memory; and my chief regret on leaving the capital of Normandy was that I had not dissected and secured every measurement of the dormer of the Place de la Basse.

MANTES was my next halting-place, and on a wet, cold, dark evening, when fires are welcome in every room, Mantes does not wear the most pleasant and inviting face to the unexpected visitor. The only hotel worth naming encouraged cats, and had a genuine old garden damp about it quite beyond the influence of wood fires. This dampness pervaded the whole house, even to the larder, and so gave a peculiar earthy flavour to one's food. The church is the only attraction here, but then it is one of a kind not easily forgotten. Exteriorly, the want of good towers is a very great drawback, for from any point of view the western quasi-towers are weak and ill-proportioned to a surprising degree, considering their early date and the good qualities to be seen in the greater part of the building. The first and pre-eminent charm about this church is the almost classical purity of its interior. The curves of the vaulting sweep above our heads with wonderful grace; the section of the ribs and string-courses are proportioned with utmost skill—strong without being in any way coarse; refined, without a shadow of weakness. A rough diagram of this vaulting is here given, showing two bays of the nave. The diagonal rib A is semicircular. The cross-rib B is semicircular and stilted; the main-rib C is





pointed and slightly stilted, and the formerets or wall ribs are pointed and stilted on nook shafts. With the exception of an admirable fourteenth-century chapel, the church throughout is of one style, viz., the First Pointed, the design dating from the latter part of the twelfth century. That the architect had his thoughts on painted decoration when he designed the interior of Notre Dame de Mantes, is an almost irresistible conclusion as we look at the broad, flat treatment of the vault and wall spaces. We should note well the grand simplicity of the composition, and what I may call the sensitiveness of the articulation—the life in shaft and arch and rib, whilst in so many old churches, and in all new ones, the arches and vaulting appear to press more or less heavily on the walls and piers, the groining at Mantes seems to grow and spring out of its supports. Words and drawings are equally incapable of expressing the peculiar grace and perfection of this work as a structural composition. I am ashamed to say I hardly noticed the carving and accessory arts, so absorbed was I with the general treatment. It was not until I surveyed the outside where the general composition is questionable that details assumed any importance. Here one becomes conscious of a grandeur of proportion in the simple, almost unmodelled lancet-windows, in the great west rose without a solitary cusp in all its broad surface, in the west-central doorway and the arcade over, and descending even to the later work of the chapel in its broad buttresses, deeply-moulded arches, and exquisite tracery. This chapel, as illustrated by M. Viollet-le-Duc (Vol. II., p. 154), is very charming, but the brilliancy and the grace of the windows, and the strength and repose of the buttresses, are wanting, and even in the construction of the tracery, I am sorry to say the fourteenth-century architect does not receive the credit due to him. In the west rose window the armature is remarkably effective in reality, for the circles in the outer openings are free of the stone-work on all sides, and about the same diameter as the quatrefoils. The scale drawing given at p. 44, Vol. VIII. of the "Dictionnaire" shows a very different treatment. I quote these cases, first because they are almost inexcusable, the original being so simple and well defined; and second, because it may be as well for those younger members of the profession who may follow me to learn to rely on their own eyesight and measurements, and observations of even well-known examples, and whilst accepting as guides the authors of popular works, not to lean too heavily on their guides, or trust too implicitly to everything they may say. There is still another great charm about Mantes, which, to fully realise, we must retire to some distance, or mount one of the western towers (the south-western is the best). I can conceive of no coloured decoration in the external architecture of the Middle Ages to exceed in loveliness of tone the tile roof of this church. I allow for the additional effect of time, and odd tiles inserted haphazard, and I remember that it was a glorious day, and that the blue of the sky was of a deeper, fuller tone than usual. But omitting these very important artistic aids, there remains a combination of three simple colours—green, yellow, and black arranged in a pattern common throughout Europe and the East, yet here so proportioned to the size of the roof, so piquantly placed at a slight angle with the horizon, and so harmonious in its colouring, that although acquainted with very careful drawings of it in Mr. Burges's work, I could not resist the temptation to draw it for myself, short as my time was. From the portion of the roof I selected for measurement, I found the sight dimensions of the tiles to be 7½ in. by 4½ in.; the glaze extends about ½ in. above the lap. The colours used are a rich green, a dark brown almost black, and a full golden yellow. Mr. Burges says the green is shaded with brown, but I rather think he must have arrived at this conclusion from a small portion which has been repaired with

the common modern brown-red tiles, as we—and there were three of us—failed to find any fourth colour used systematically. Repairs covering a great number of years have resulted in scattering the colours a little, and throughout the whole roof we observed that black tiles had got amongst the green, green and black amongst the yellow, and red-brown or the modern tile everywhere. It is worth noting that the green glaze is far better preserved than the others, and very like in tone to some still used on the common water jars of the south of France. At one thing more the student should remember to look long and intently, viz., the chief doorway of the Western End. In size and depth this door does not perhaps attain the standard of what we understand by the word portal, but what it lacks in size is fully compensated by the proportions, and the almost Greek delicacy, of some of its carved work both in design and execution.

E. W. GODWIN.

#### THE CHATEAU OF PIERREFONDS.— VIOULET-LE-DUC.

THE *Times* of Tuesday last contains a long letter from the pen of Charles Wethered, of West Grange, Stroud, on the "Restoration of Historical Monuments in France." The restorations commented on are the Cathedral of Notre Dame at Paris, the Abbey Church of St. Denis, and the Chateau of Pierrefonds. The following is the concluding portion of Mr. Wethered's interesting letter on Pierrefonds and its celebrated restorer:—

"The Chateau of Pierrefonds, built originally by Louis, Duke of Orleans, one of the most powerful nobles in Europe at the close of the fourteenth century, is a faithful reproduction of one of the finest Mediæval structures in the world. It is a majestic feudal castle without, and a magnificent palace within. I know of nothing that conforms better to Ruskin's cardinal principle of breadth in well-building—breadth of everything—'solid stone, broad sunshine, starless shade.' The partial rebuilding of it has employed a thousand men for twelve years, whereas it was originally completed from its foundations in eight. In roaming through this place of art—in exploring its maze of towers, halls, staircases, corridors, and chambers, so seemingly intricate and yet so intelligently arranged in view of their various purposes—we seem to be carried back from our colder era to the days of old romance. From the Grande Salle or Salle d'Armes, 230ft. in length, with its huge double fireplaces, surmounted at one end by the lovely statues of the Nine Preuses, or feminine types of chivalry—its vaulted ceilings, stately windows, and painted walls, the lofty and richly carved chapel, the *chemin de ronde*, and range above range of defences which crown the seven round towers, each from 200ft. to 300ft. high, the vast subterranean vaults, fearful dungeons, and *oubliettes* reaching to an immensity of depth below the level of the court—all these excite the wonder of the beholder, and leave on his mind a lasting impression of the restorer's genius to revivify the past. At almost every step we meet with something that suggests a tale of human exploit, or some transcript from the page of Nature. Among the statues of historical personages there is an exquisite one of Joan of Arc, placed over the entrance of the great hall of reception from the courtyard. Near that of the inspired maiden is the chosen spot for the bronze equestrian statue of the ducal founder, but having met with some mishap in returning from the Vienna Exhibition, the hero has not yet mounted his pedestal. An excellent reduction by Barbedienne in the author's studio enabled us to form an accurate notion of the perfect modelling and statuesque feeling of the original. The valiant knight, equipped in his panoply of war, with vizor up and lance in rest, looks 'incorped and demi-natured with the brave beast,' and ready to do his devoir before all men. Here and there, on jutting frieze or other coigne of vantage, the same master hand has rendered the grotesque in almost endless fantasy of bird and beast. There are many happy adaptations, too, of effective types of leaves and flowers, with other intimations from the living world of vegetation in the woods and fields around.

"In short, everything at Pierrefonds attests the

power of one re-creative mind to set before us, with an added lustre of its own, all that was grand in ornamentation and truthful in construction of the churches and palaces of those Middle Ages when men wrought nobly from sheer love of their handiwork, and thus stamped the impress of their hearts and souls upon it—those Gothic times when, as Mr. Ruskin forcibly reminds us, 'writing, painting, carving, casting—it mattered not what—were all done by thoughtful and happy men; and the illumination of the volume and the carving and casting of wall and gate employed not thousands but millions of true and noble artists over all Christian lands.'

"While at Pierrefonds we spent some very pleasant hours in wandering through the hunting forest of Compiègne, a rich woodland tract stretching many miles around, and far enough from the maddening crowd to suit the philosophic Jacques. Now and then we were gratified by catching sight of the chateau under changing aspects of light and shadow. Nothing could be finer than the picturesque grouping of its soaring towers and battlements as seen by us in the serene glow of a June evening, from the rising ground which commands the great portal of the donjon or keep, defended as in olden times by drawbridge and ponderous portcullis. The lordly pile, flushed with red gleams from the setting sun, projected in bold massive relief against the clear blue depths of heaven. One of the most striking objects was a winged statue of Saint Michael, of heroic size, in copper, surmounting the chapel roof. Tramping down the wicked dragon, and brandishing his cross of fire, the radiant Saint, to the eye of fancy, looked in the glittering sunlight like a swift angel descending from on high to destroy evil and make day upon earth glorious.

"Viollet-le-Duc's pen has been as prolific as his pencil. In his published works we find a masterly and comprehensive survey of various provinces of art not obtainable elsewhere. With a rare capacity for acquiring and assimilating a knowledge of the history of all nations and epochs, he has shown, along with other searchers in the same wide field of enquiry, that the most authentic evidence of the social and political condition of countries is that reflected in their arts, and above all in the 'magnificently human art of architecture.' In the case of France they form an unbroken chain of historical landmarks, whose links connect the ancient world with the modern—the abiding witnesses of the triumphs and tragedies of a great and gifted people, who have exercised a mightier and more continuous influence over the affairs of Europe than any other nation since the fall of the Roman Empire. Her ample series of documents in stone in themselves go far to ratify the recent assertion of an able Edinburgh Reviewer, that, 'the grandest of all national histories is that of France.'

"Individually, Viollet-le-Duc is an intellectual king among men, with personal attractions of dignity and grace befitting a descendant of the old noblesse. I have never seen a nobler head or a countenance more expressive of mental power. He comprises the seriousness and solidity of the English character with the *verve* and *esprit* of the French temperament. Most of us, I suppose, accept to the full Carlyle's helpful doctrine of hero worship—of loyal recognition of honoured chiefs in every leading sphere of human thought and action; and here we have a notable living example of the hero as artist, as poet or seer, who speaks to us for our instruction and delight, not only in the printed volume, but in the still more fascinating language of form and colour. He approaches truth on its æsthetic side, and his doings are the record of its perception and embodiment in outward visible shape. The thousands who work under him, and catch some of his spirit, may well look up to such a man with sincere admiration and respect. One of his principal employés said to us with hearty enthusiasm, 'He knows everything—from astronomy and geography down to cookery, and it all comes like music from his lips.' In his numerous executed works, whether original or derivative, everything, as his friend Mr. Ruskin would say, 'is fitted to a place and subordinated to a purpose,' imparting to all he does that sense of satisfaction which we feel when contemplating the higher results of artistic unity and completeness. He is not less successful in the representation of ideal thought and sentiment than in the rendering of direct specific fact. He never repeats himself, and nothing can stale his infinite variety—from the delicate aerial lines, woven as if by fairy work,



of the aspiring *fleche* which so gracefully crowns the cathedral of Notre Dame, to the grand simplicity and aptness of every detail in his own house at Paris.

"In the course of our trip I learnt from my friend something of the daily routine of life and study by which this eminent man has been able to accomplish so much fine and enduring work, which perhaps may not be unprofitably recounted in an age of luxury and ease as a pattern for the guidance and well-doing of others. He enters his studio at seven in the morning, where he is engaged till nine in getting in readiness the work that will be called for, and preparing for his visitors, whom he receives from nine till ten, during which he takes his frugal breakfast standing. At this hour will be found awaiting the manuscript for the publisher, a pile of wood blocks for the engraver—who has only to follow the cut between the sharp lines of the finished drawings which cover them,—plans for the builder, designs for the sculptor and blacksmith, and cartoons for the decorator or glass-painter—every one of which is the product of his own hand. For each of his staff as he arrives, after his "*Voilà Monsieur votre affaire*" and verbal instructions, he has a kind word of friendly enquiry, encouragement, or advice. At ten his studio is closed, and he works at his drawings without interruption until his dinner-hour at six. A seven he retires to his library, where he is engaged with his literary pursuits till midnight. This, his daily life at home, is but little varied when away. He generally travels by night, often taking journeys of several hundred miles; for he visits every building upon which he is engaged once a month, making any special drawing required on the spot. He gives his instructions personally to the workmen, each of whom he notices in making his round of inspection. Though he has himself a perfect acquaintance with the technicalities of every craft, he does not disdain to consult their opinion, and he can, so we are assured by the men themselves, always teach something worth knowing belonging to the practical department of each. He will take the hammer and pincers of the plumber and show him how to beat or twist his lead to the required form, or the chisel from the sculptor, and with a few strokes gain for him the desired expression. He gives a perspective detail of every drawing, however small, and his designs for sculpture and goldsmiths' work are drawn with photographic accuracy. His most accomplished sculptors say that it is impossible for them to render all the *finesse* of his delineations. And these beautiful sketches come from his hands by thousands; those forming the exquisite illustrations which adorn the published works would of themselves bear testimony to a life of rare industry and skill. But the most surprising thing of all is that he works entirely alone, unaided by clerks or assistants of any kind. As proof of his remarkable powers, there is an instance, the truth of which I can vouch for. By the cession of Nice and Savoy, France got possession of a considerable portion of the Alpine region. No maps other than the vaguest and most inaccurate existed of this new territory. At the request of the French Government, Viollet-le-Duc undertook to survey and map it. For this purpose he spent the months of July and August of last year among the mountains, and there, unaccompanied and unaided, during that short space of time, by means of his observations, sketches, and wonderful memory, he made himself so perfectly acquainted with the topography of the whole district that, to use his own words, he knew the ground as well as if he had made it. Within another two months, after his return home, he had drawn to a large scale three accurate and beautiful maps of the French Alps:—A *carte à vue d'oiseau*, which shows the mountains, the snow, the glaciers, the rocks, and the very moraines, as they would appear to the eye from a balloon; a *carte géologique*, which exhibits the formation of the hills, even to the very crystallisation of the rocks; and a *carte routière*, on which is faithfully delineated every track, stream, crevasse, chalet, or other object which can guide the tourist, who, with this map in hand, may find his way alone throughout the mountains. These maps, which have won the warm praise of members of the French Academy and other *savants*, will occupy two of the most expert engravers of Paris at least a score of months to execute in a form for publication worthy of the originals. This is not all. During the evenings of those two months passed in the mountains, he wrote and illustrated one of the

most instructive of his smaller books, an English translation of which, I am happy to hear, is about to appear, entitled, 'How to Build a House.'

"He is regarded as a high authority on the subject of modern, as well as of feudal, military engineering; and a treatise of his, now in the Press, *L'Histoire d'une Forteresse*, which describes how a fort should be built, will doubtless contain much theoretical and practical information on that important branch of the science of war. During the siege of Paris no officer of the Engineers was more actively engaged or more skillfully contributed to the defence of the city.

"In his construction generally, Viollet-le-Duc employs and combines the various modern materials with a scientific knowledge and artistic feeling unapproached by any one engineer or architect of our own day. He is becoming in France the veritable founder of a new School of Architecture. Though based on careful study and analysis of the ancient schools, it is not a mere revival or copy of what has been before, but a faithful expression of our present requirements and means. He brings into harmonious conjunction those vital elements and immutable principles of art which guided alike the Greek of the time of Pericles and the masters of the Middle Ages. The more they are studied, the more I am convinced it will be seen and felt that the achievements of this celebrated Frenchman in the associated arts of Architecture, Sculpture, and Painting are not less remarkable for their catholicity of range than for the beauty of their design and mastery of execution. Having myself derived mental health, pleasure, and profit from devoting a country doctor's short holiday to their inspection, my object in making these notes will be fully served if they should in any way be the means of prompting others to more thoroughly investigate works whose fame will be for ever identified with the historic buildings it has been their restorer's happy fortune to hand over to posterity in a state of renovated completeness, not unworthy of their original nobleness and grace."

#### THE WATER-SUPPLY OF PARIS.

A CORRESPONDENT of the *Daily News* gives some interesting particulars of the manner in which Paris is supplied with water. The newly-constructed Reservoirs of Montsouris are characterised by him as one of the wonders of modern Paris, and as the perfection of hydraulic work. Until these works were completed, the Parisians possessed only 338,000 cubic metres of water, or 1,108,900 cubic feet: that is to say, 140 litres per head. This water comes from the springs of Belleville and the Près St. Gervais, the artesian wells of Grenelle and Passy, the springs south of the city, formerly called "Royal Springs," passing by the aqueducts of Arcueil, the rivers Ourcq, Marne, Seine, and lastly, the Dhuis, which is diverted from its course almost at its source, and which made its first entrance into the city of Paris in 1865. The waters of the Dhuis are received in the magnificent reservoirs of Menilmontant on the second story, and comprise 100,000 cubic metres of water, whilst the first story of these same reservoirs receives the waters of the Marne. It is simply two lakes, one above the other. Maxime du Camp justly calls this "a unique construction," for, says he, "when I call to mind the cistern at Constantinople, with its thousand and one pillars, the dam in the Valley of Belgrade, the 'Piscina Mirabile' at Naples, Solomon's wells at Ray el Din, and the cistern of Hezekiah at Jerusalem, I can find nothing at all analogous, and I believe that in all ages nothing equal to it has been produced. It appears all but miraculous, when we consider its marvellous conception, and the immense difficulties in its construction. It is a triumph of genius and scientific industry." The work has cost 3,700,000 francs, and covers a surface of two acres, and is one-third less in size than that which is now being completed on the heights of Montsouris. In a short time the Parisians will be in possession of an additional supply of water, amounting to 328,100 cubic feet, consequently giving in all 210 litres per head, instead of 140. These great hydraulic works distribute in Paris the waters of the river Vanne, taken at their source in the Department of the Aube, about 104 miles from Paris, and brought by aqueducts through a pipe of cast-iron of upwards of a metre in diameter. This gives one metre 10 centimetres cube of water per second, which flows into the reservoirs. These reservoirs are four in number, two on the lower

and two on the upper story. They are completely separate, but can be united to each other according to the requirements of the service, or for repairs, &c. It is a perfect forest of pillars made visible by a very peculiar light let in through semicircular air-holes. In each section there are 900 columns ranged in thirty equal divisions, making in all 3,600. These columns, as well as the arches and the floor, are made of stone, covered with cement. The columns gradually diminish in circumference until they reach the height of five metres eighty centimetres, where the arches commence which unite them. The greatest elevation is 7 metres 10 centimetres. The pillars of the upper story are inferior in height and strength, not being required to support an equal weight of water. This floor will contain only 100,000 metres of water, whilst the lower floor will contain 200,000 metres. The whole will be covered with 50 centimetres of earth, to be sown with grass, intended to preserve the water from the influence of atmospheric changes. Its external appearance is that of a massive building with but few apertures, and is by no means ornamental. This water will supply the principal quarters of Paris, and will replace that of the river Ourcq, which is in such a filthy condition that the iron gratings through which it passes require to be cleansed three times a day. These colossal works will cost 5,000,000fr.

#### WESLEYAN CHAPEL BUILDING.

AT the recent Methodist Conference at Cambridge, the subject of chapel building occupied its due share of attention. From statistical accounts laid before the committee, it appeared that there were now in the Connexion 7,486 chapels, providing 1,723,980 sittings, as against 5,685 chapels, and 1,160,292 sittings in 1851. This statement, however, requires explanation, for in Mr. Horace Mann's report the figures are 6,579 chapels and 1,447,570 sittings; so that the increase would be only 907 chapels and 276,410 sittings, instead of 1,801 chapels and 563,688 sittings, as now stated. The Rev. Dr. Osborn observed that when they saw that in the last twenty years upwards of a million sterling of debt had been removed, that in the same period a total expenditure of three and a quarter millions had been made, and that the amount actually contributed in Great Britain, including aid from the Connexional Fund, but not including loans, was £3,415,218, they might well thank God and take courage. He uttered a note of warning, however, and intimated that this zeal for chapel building might be cultivated at the expense of something better, as it was said a thousand years ago, that when the vessels were gold the priests were wooden, and when the vessels were of stone, then the priests were golden. He also found fault with open-roof chapels and churches, now so much in vogue. Preachers did not wish to preach where the voice was lost amid the rafters, or where the people were abstracted or distracted by a variety of echoes all through the sermon. In two places where he had recently assisted at the opening of chapels he had found that parts of the sermons were not heard, owing to the construction of the building, and he had heard of another case, only far worse, in another quarter. If Dr. Osborn attended Church of England churches, he would find hundreds, if not thousands, of them in a similar condition. But what of that, if the architects consider high roofs pretty? Why need the convenience of preachers or hearers be studied if a good effect can be obtained at the expense of their convenience? Many architects who will go into a state of hysterical admiration of what they consider beautiful Gothic, are quite innocent of what the necessary acoustic qualifications of a building should be. They will criticise, till you are weary, any æsthetical discrepancy, or what they think such, but never think of bestowing any attention on acoustic blunders.

The last of the well-known "haunted houses" in Stamford-street, Blackfriars-road, which were bequeathed by the eccentric Miss Angelina Reed to the Brompton Consumption Hospital, is now demolished, and on its site the foundation-stone of the Central Bank of London was laid on Monday.

The Rev. J. F. Burnaby is about to erect a new church at his own cost in the neighbourhood of the Spinney Hills, a rapidly increasing new suburb of Leicester. Sir Gilbert Scott is the architect. Mr. Burnaby, it is stated, is not likely to expend less than from £30,000 to £40,000.



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## ILLUSTRATIONS.

MILTON-HALL, KENT—MIDDLEHAM CASTLE, YORKS.—PAPER STAINING WORKS, GOSWELL-ROAD—SCHOOLS AT WARE—CHRIST CHURCH, NICE, FRANCE.

## OUR LITHOGRAPHIC ILLUSTRATIONS.

## MILTON HALL, GRAVESEND.

THE accompanying illustrations are north and south views of a new residence for G. M. Arnold, Esq. The design is in the period of Middle Pointed English work. The plans sufficiently explain themselves, having the usual accommodation for a country house. The principal feature in the design is a large hall or reception-room, 40ft. by 24ft., 34ft. high, with an octagonal bay the whole height of the building. In this hall there is an open gallery connecting the wings of the house, and the room throughout is lined with wall panelling 8ft. high. Over the porch is a private oratory for the use of the family. Materials are red facing bricks, with Box Ground stone and Broseley tiles. The works have been executed by Messrs. Haward Bros., of Quebec-street, under the superintendence of the architect, Mr. G. Somers Clarke; Mr. T. Bevan, clerk of the works; Mr. Soule, foreman.

## MIDDLEHAM CASTLE.

This stupendous pile of masonry (for at present there is nothing else) is situated a few miles from Bedale; there is but little to satisfy the curiosity of the architect, it having been robbed of all its details by neighbouring builders, who have used it as a stone quarry for some indefinite period, and helped themselves rather freely to the wrought stonework, such as window tracery, mullions, jambs, &c., as will be seen by the sketch. One cannot imagine how such wholesale destruction could have been tolerated, no matter when it occurred; it has, however, ceased at last, now that nothing remains of any value; as to the wall stones, it would be far more profitable for them to hew the solid rock than attempt to free them from the mortar in which they are bedded. As a proof of its tenacity, in one case there is a gigantic mass of masonry some 50ft. in height, with a projection from the main wall of 15ft.; it is apparently immovable, though entirely cut away at the bottom; in fact, corbelling and overhanging appears to have been a mania with our ancient brother, whose method in many cases is very ingenious and picturesque.

## PAPER-STAINING WORKS, GOSWELL-ROAD.

The illustration represents the Goswell-road front of the Paper-Staining Works recently rebuilt, after a fire, for Messrs. Erwood and Co. The front is faced with red bricks from Rowlands Castle; the strings, hood-molds, &c., of red terracotta from the Midland Terra-cotta Company's Works, and the piers, capitals, &c., of red Mansfield stone. The contractors were Messrs. Clarke and Bracey, of Coleman-street, and the architects Messrs. Perry and Hanson, of Thames-chambers, Adelphi. The total cost was about £4,000.

## CHRIST CHURCH, NICE.

The body of the church of which we give an illustration was erected, about 15 years ago, and was one of the first English Protestant churches erected on the Continent. It is now proposed to build a chancel and organ-loft, the land having already been purchased for that purpose. The church is erected in grey limestone, with white stone dressings. The cost of the alterations, with fittings, complete, is £4,000, and the work is designed by Mr. T. T. Smith, architect, Bloomsbury-square, who is carrying out other works in that neighbourhood.

## NATIONAL SCHOOLS, WARE.

One of our illustrations represents an alteration being carried out to the National Schools, Ware. The existing schools are being re-

modelled, and a new boys' school is being attached to the south of the present building; a teachers' house is on the left flank, and on the right are rooms also now building for the Vicar; the work is carried up in flint, with red brick and stone dressings. The contract for the school and residence has been undertaken by Mr. Clarke, of Epping, at £980; the Vicar's rooms being built by Mr. Allen for £325, Mr. Thos. T. Smith, of Bloomsbury-square, being the architect.

## THE CAMBRIAN ARCHÆOLOGICAL SOCIETY.

THE annual meeting of the above Society commenced at Wrexham on Monday. Sir Watkin Williams Wynn delivered the inaugural address. He remarked that the Wrexham district afforded an immense field for the Society's operations, and expressed a hope that the excursions of that meeting might be rich in results. The annual report, read by the secretary, the Rev. E. S. Barnwell, showed the Society to be in a flourishing condition. Several papers were afterwards read by members of the association.

On Tuesday the members proceeded to Chirk by the Great Western Railway. On arriving at Chirk they were met by the Vicar, the Rev. Mr. Thompson, who conducted the party over the Castle, after spending two hours in inspecting which, the company returned to the railway-station, and were conveyed to Ruabon for the purpose of visiting Wynnistay, the seat of Sir Watkin W. Wynn, Bart., M.P., who entertained the members to luncheon. On the conclusion of the repast, on the proposition of Professor Babington (of Cambridge) a vote of thanks was accorded to Sir Watkin for his hospitality. The party subsequently inspected the church at Ruabon, and a paper was read by the Rev. E. W. Edwards, Vicar, descriptive of the edifice and the fresco recently brought to light on the south wall, and which, it is said, must have been executed in the fourteenth century. Mr. Whalley, M.P., produced for the inspection of the members two pieces of stone, which he said were part of a monumental effigy found in the church, and belonging to a period about the fifth or sixth century. However, Mr. Bloxam, an authority on such matters, gave it as his opinion that it certainly was not of any earlier date than the fourteenth century. Mr. Whalley seemed very much crest-fallen at this dictum, and the stones, which he had brought to the place in his carriage, were left on a gravestone when the party left, Mr. Whalley having apparently done with what one of the members remarked was "another false claimant." After visiting some other spots of interest, the company returned to Wrexham for the evening meeting.

The evening meeting was presided over by Professor Babington. Addresses were delivered by Mr. Bloxam and other gentlemen.

On Wednesday the members made an excursion to Chester. The Dean of Chester, in welcoming the party to the Cathedral, said the edifice, being close to the Welsh borders, had, he fancied, been the monument of many hard struggles between Welshmen and Englishmen; but now it was a common ground upon which they could meet in harmony to instruct each other. He detailed the architecture, carved work, and stained glass windows of the edifice; and called particular attention to the misereres, which had been removed from the choir to the chapter-house, for their beautiful workmanship, their peculiar mixture of religion and the grotesque, and their relation to superstitious legends connected with the patron saint (St. Werburgh). In the choir, which is now being restored, the organ would be placed on a level with the piers dividing the nave from the north aisle, while the broad aisle would be open from the western door to the east end of the lady chapel, with the exception that the open tabernacle work to the west of the choir would remain. The choir, he said, would require several thousand pounds

to be collected before it could be finished. Money came in—how he knew not exactly; but unless sufficient funds were received, the building would have to remain unfinished, as he would not go into debt. He said he had received wood from Palestine, Lebanon, and Bashan, and was promised wood from Gethsemane to make a Communion-table, and had also had several promises of £50 each for the erection of stalls. He believed the Freemasons of the county were going to present a pulpit to the cathedral. Some interest was excited on the dean's pointing out what there was every reason to believe was the tomb of Ralph Higdon, the monk and historian of Chester Abbey. After the members of the Association had been shown through the cathedral, they proceeded, under the guidance of Mr. W. Foulkes and Mr. T. Hughes, F.S.A., to visit the church of St. John, the rows, the walls, and the ancient houses, crypts, &c., of the city, returning to Wrexham in the evening. The Rev. Mr. Barnwell, on behalf of the company present at the Cathedral, guaranteed a donation of £25 towards the restoration of that edifice.

## RECESSED WINDOWS.

HOWEVER diverse in form, the ideas of architects generally run in grooves—that is to say, we scarcely see any wide departures from methods of construction which have been followed for ages. In the matter of windows, for example, while we have every conceivable kind of flat, bow, bay, oriel, and projecting window, we do not see this order broken through. Now, there is a little departure which may be made very effective, if not in all cases economical in crowded sites, where room space is more thought of than balcony room. We allude to the plan of recessed windows, and which, although there may be one or two instances, is scarcely ever seen. Let us take an ordinary front. The first-floor windows might be made the exact reverse of a canted projecting one, or we may imagine an ordinary bay or cant window pushed inwards instead of obtruding outwards. There would be no loss in outlook except that the eye could not catch the fronts of buildings on the same side, though the innovation would give as large a field of view as the common projection, or at least practically as large. The front wall could be carried on a screen of columns, or arched over, and the greatest advantage of all would be obtaining a paved balcony or space in front of the window for outlook or conservatory purposes. This kind of recess may be carried up through all the stories, and a considerable amount of effect realised. An upper floor alone treated in this way has an admirable piquancy about it; it forms a deep shadow under the eaves line, and the space may be utilised as a flower garden or otherwise. The room lost by this kind of window would be more than atoned for by the uses to which the exterior space could be put. It need hardly be added, such recessed windows would be cooler in exposed aspects; windows could be thrown open, and even *al fresco* comforts indulged in by the interposition of a thin blind or screen. The plans of these recesses could be rectangular, semi-octagonal, circular, or elliptical, whichever form suited the room best, or which economy dictated.

The memorial to the Scottish artists, George Jameson, William Dyce, and John Phillips, is to take the form of a stained-glass window, which will be placed in Old Machar Cathedral, Aberdeen, and will be executed by Mr. Collier, of London.

New schools, to accommodate 260 children, were opened at Willesborough on Thursday week. The cost of the building is about £2,540. Mr. Pearson, of London, is the architect, and Mr. Spain, of Dover, the builder.

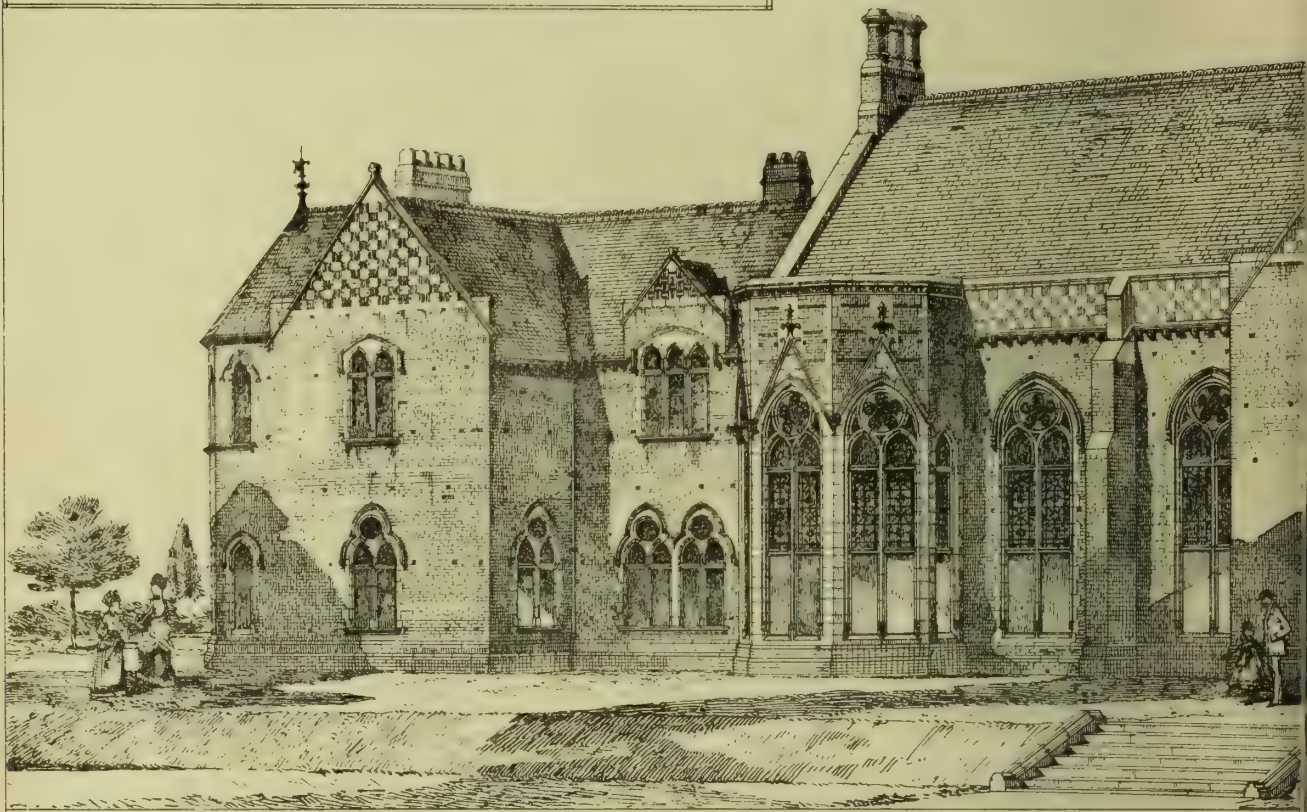
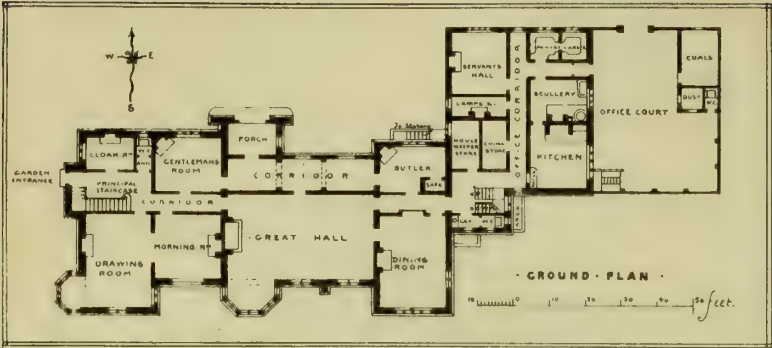
Dr. Kjellberg has related a case of a young man who manifested symptoms of arsenic poisoning, and who it appears after being sent away to travel enjoyed health, and suspicion pointed to a green carpet upon the floor of his chamber. An analysis revealed the fact that a large quantity of arsenic was contained in the colouring.







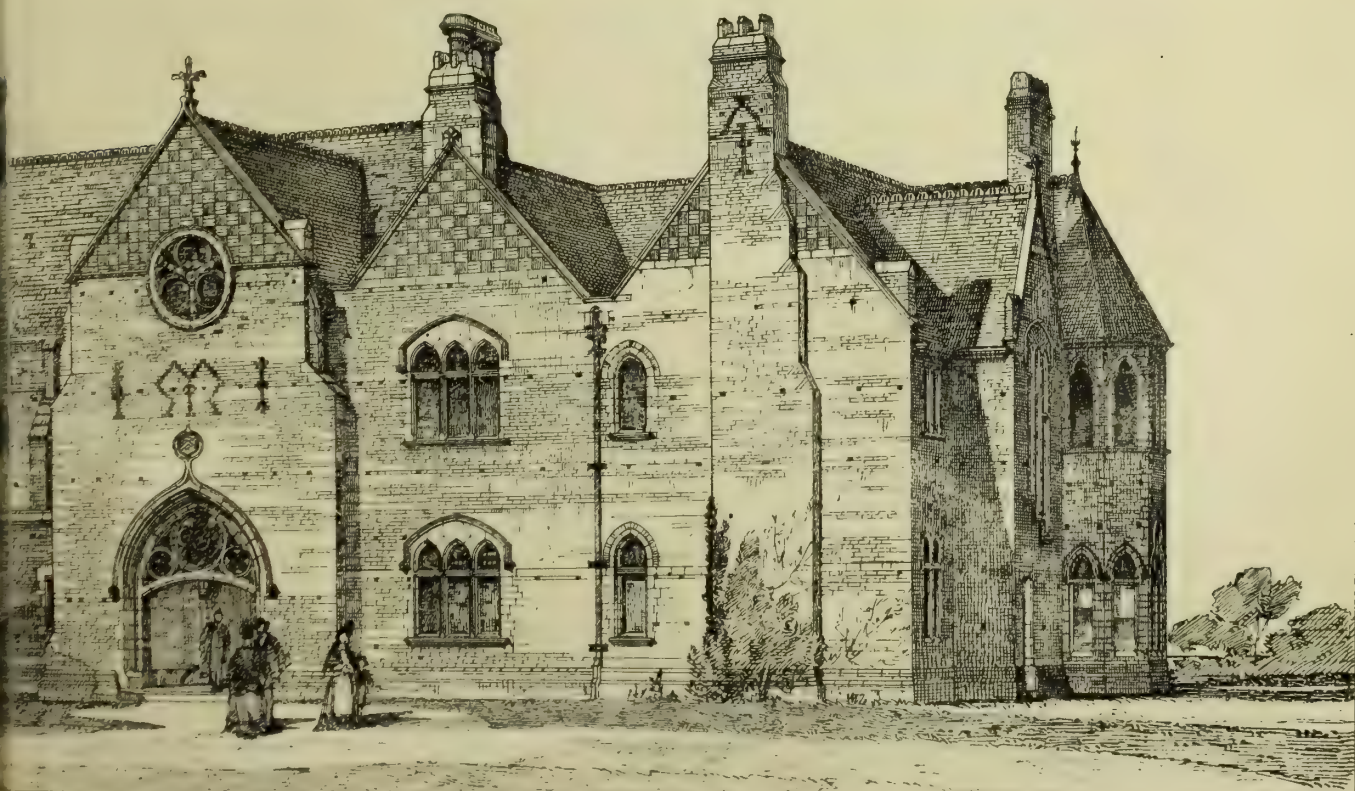
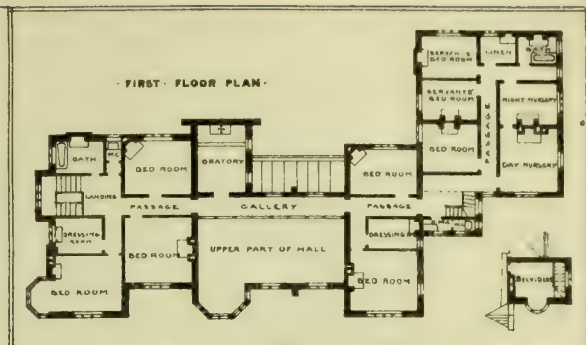
MILTON · HALL · KENT  
GEO.





WS AUG. 28. 1874.

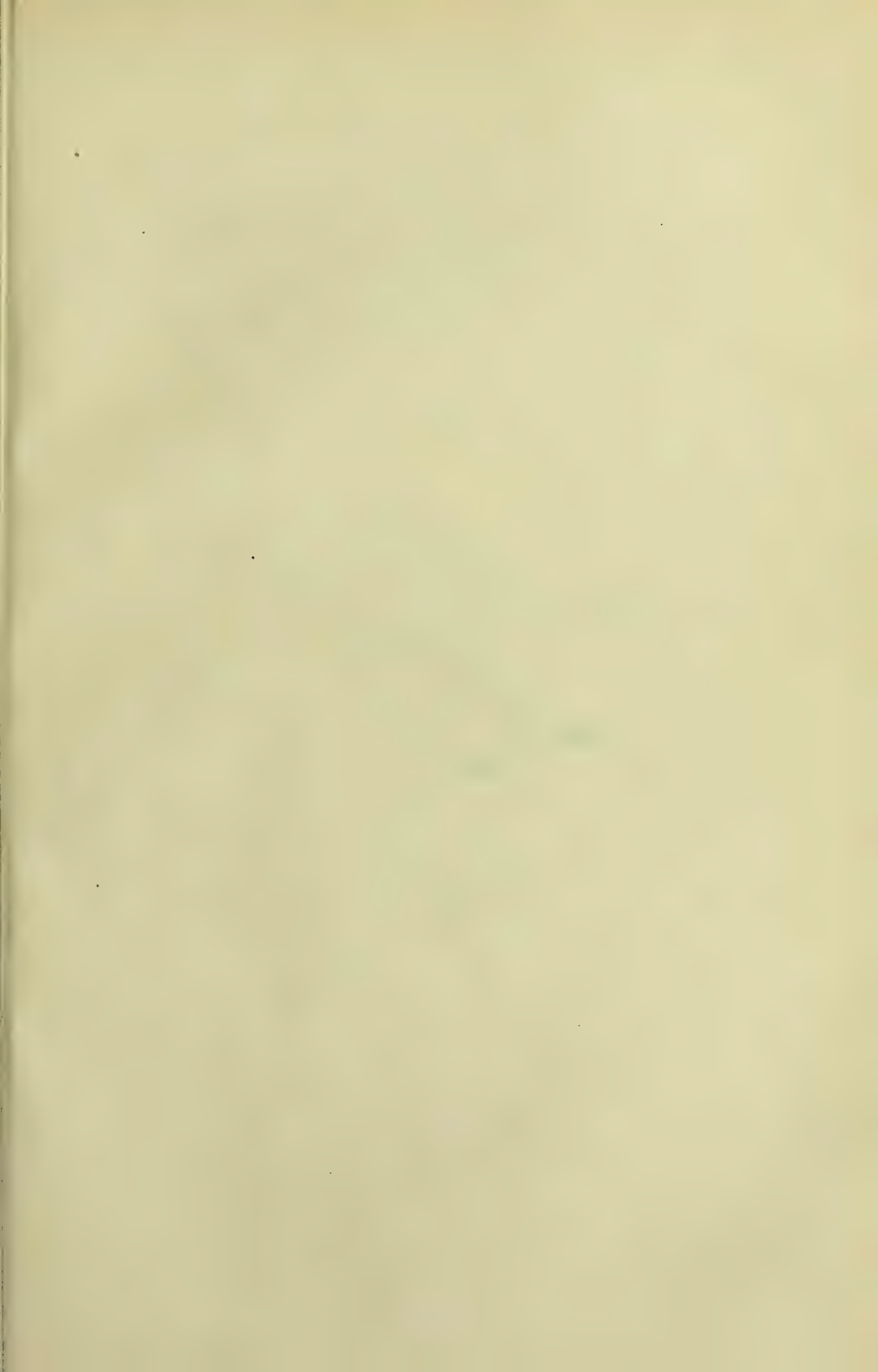
THE RESIDENCE OF G. M. ARNOLD ESQ  
J. CLARKE, ARCHITECT.



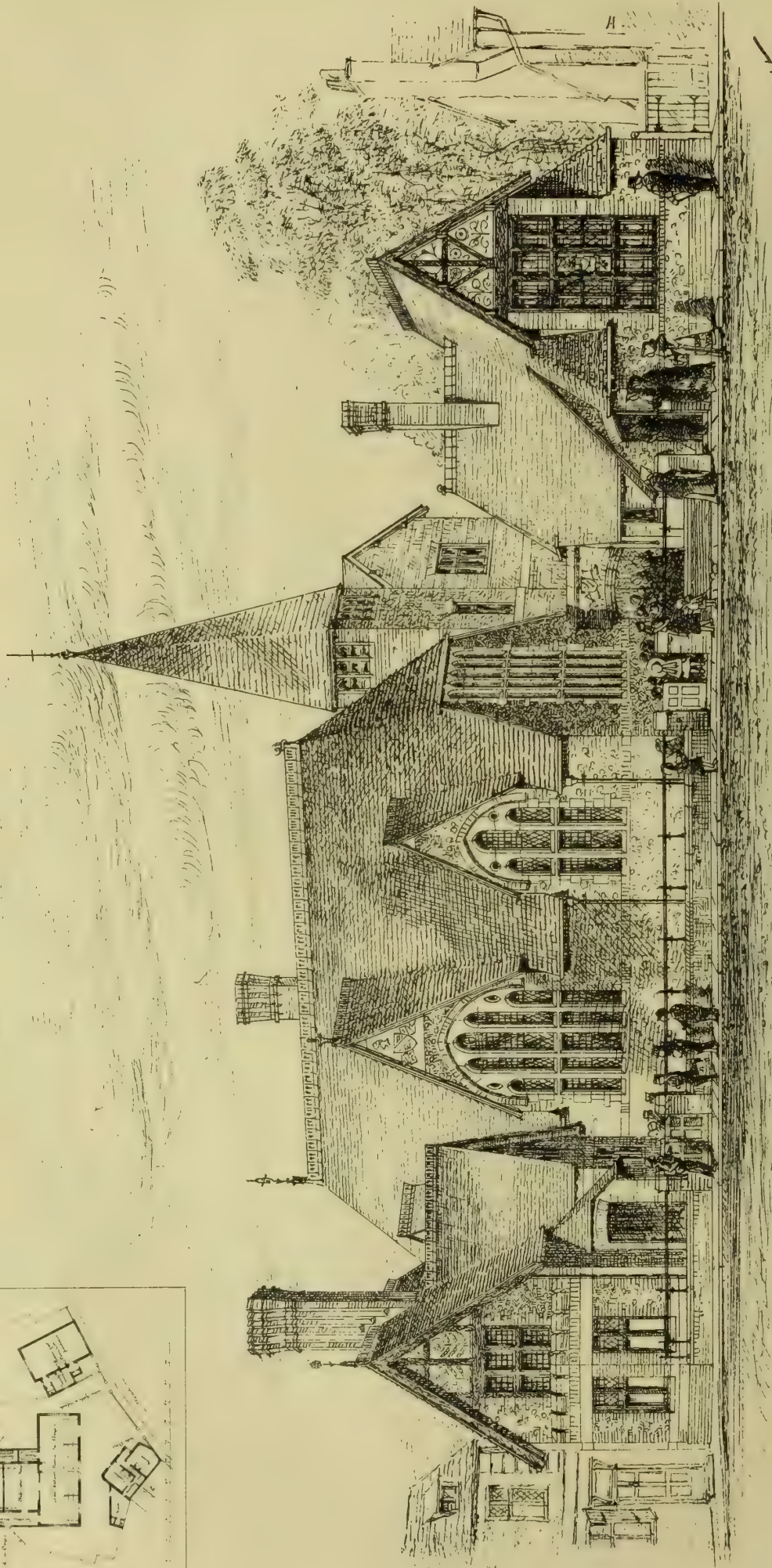
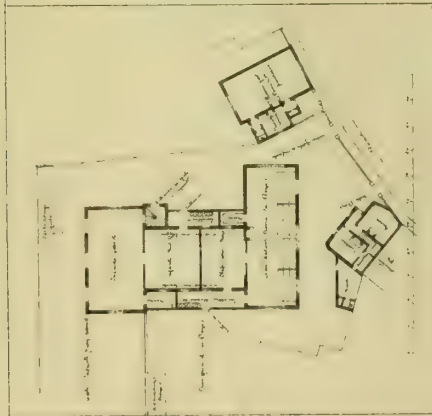












Design for alterations & additions to schools

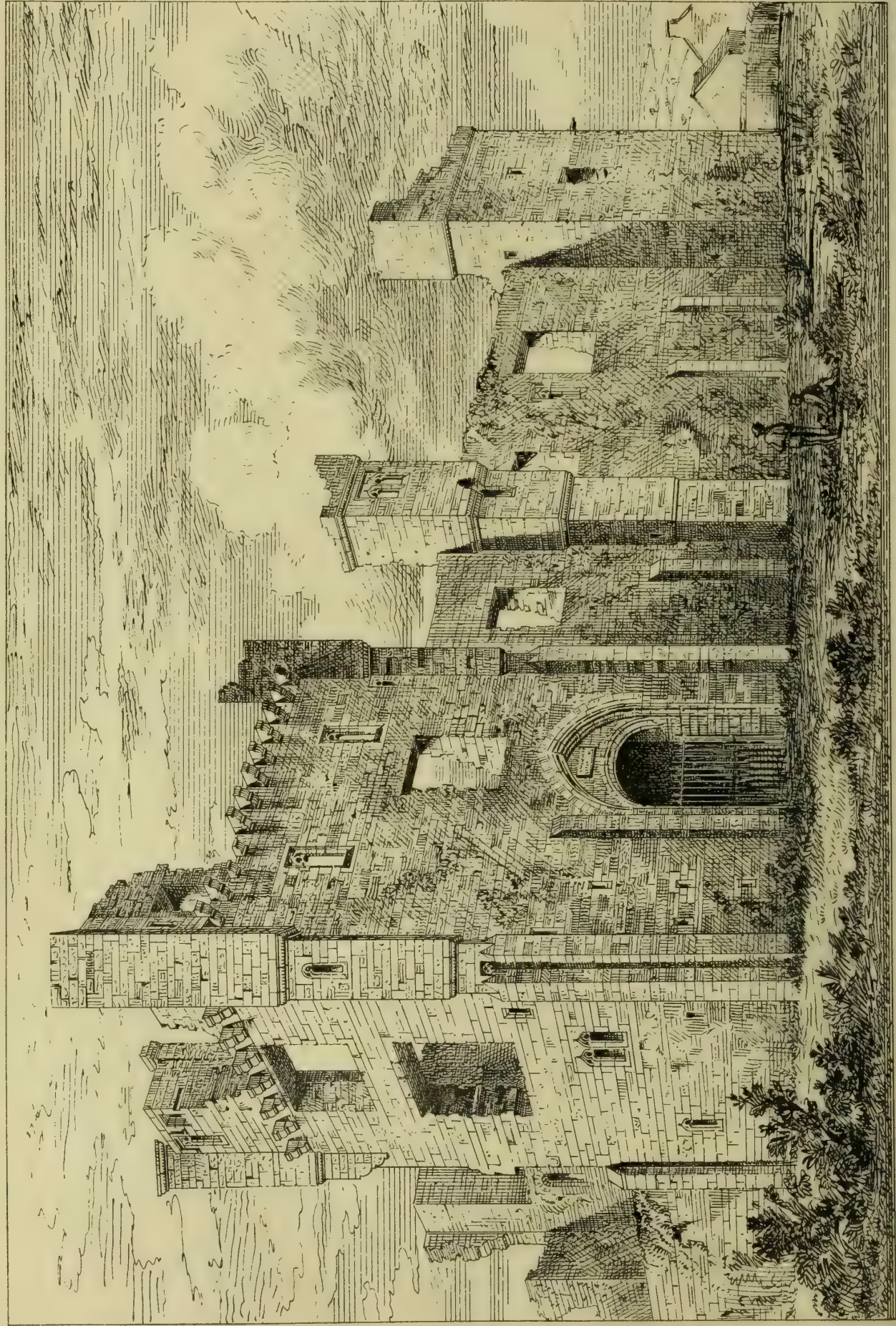
—Wool—

*Thomas C. Smith & Sons  
Pleasancebury Square*



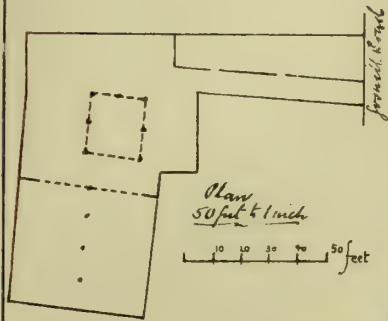






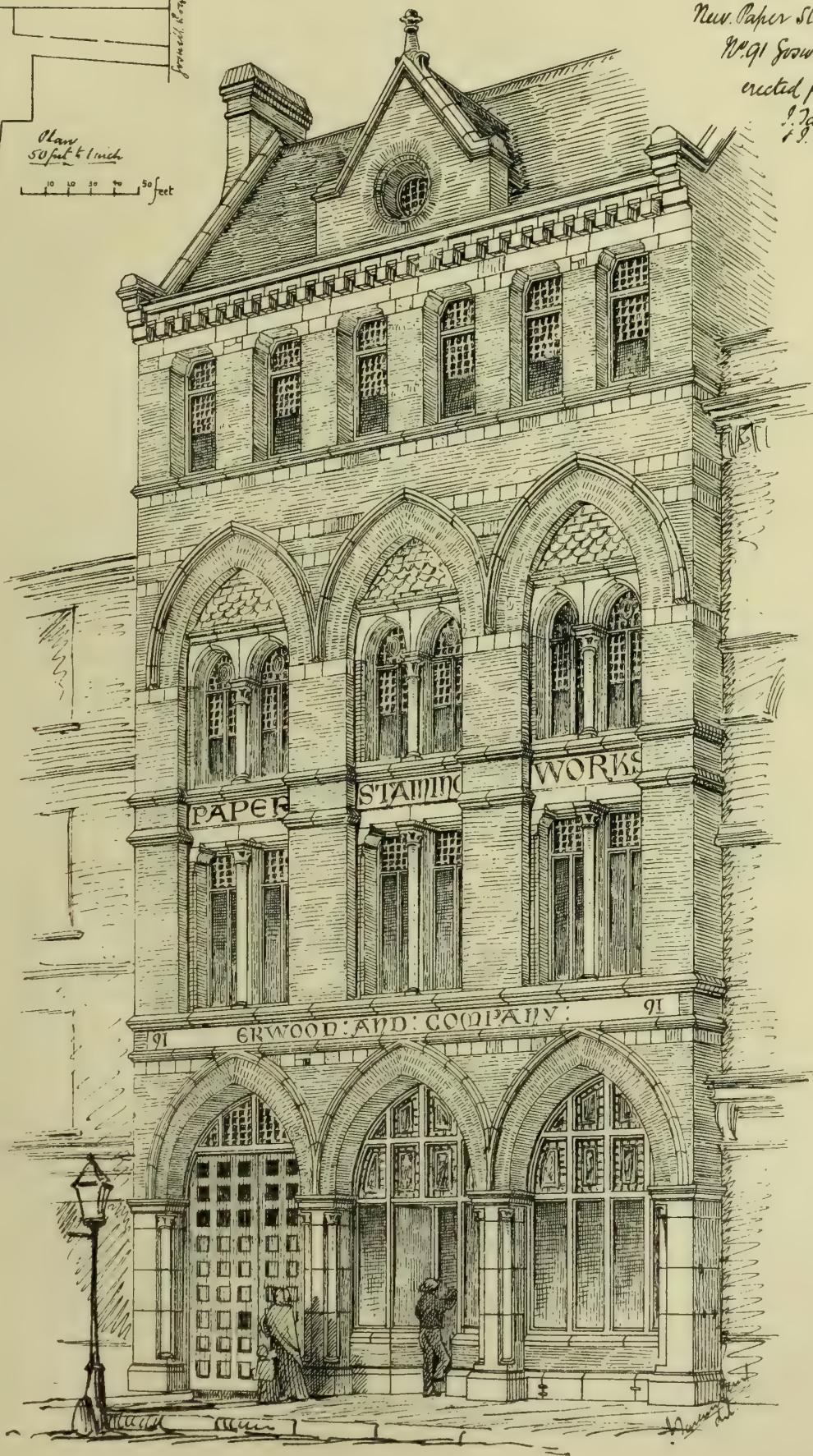
Middleham Castle, Yorkshire





New Paper Staining Works  
No. 91 Goswell Road City  
erected for Erwood & Co.

J. Tavenor Perry  
& J. Readway Hanson  
Architects









CHRIST CHURCH NICE FRANCE



· VIEW OF NEW CHANCEL ·

T. T. SMITH, ARCHITECT.







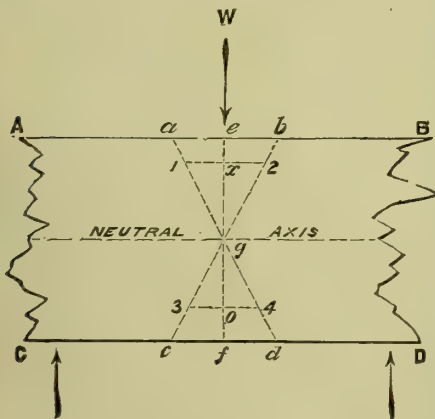
## THEORY OF THE STRENGTH OF BEAMS.

IN no instance is the value of experimental demonstration more necessary than in the study and comprehension of the principles and formulae which relate to the strength and strain of materials. It is not enough that clear rules should be given; ocular evidence is required to assist the learner in his ideas. Only lately has the method known as the graphical method of determining strains and forces in structures received the attention it deserves, and has, in our new books on Engineering and Construction, supplanted or supplemented trigonometrical or numerical means of arriving at results. Let us take the ordinary strains on a beam. What is the principle enunciated?

"The strength of a beam is *directly* as the breadth and square of the depth, and *inversely* as the length"; i.e., if the breadth be doubled, the strength is doubled; but if the length be doubled the strength is reduced to one-half its original strength; or the general expression or formula is this:—

$$\text{Breaking strength or weight} = \frac{\text{Breadth} \times \text{depth}^2}{\text{Length}}.$$

This is easily comprehended after the principle is explained experimentally, but till then the squaring of the depth is not so evident. Why is the depth squared and multiplied into breadth? is the oft-repeated question of the tyro in this branch of applied mechanics. Now the only way of explaining this is to show by diagram or model the actual part taken by the fibres of the material, to explain the neutral axis or plane, as it is called; and what part of the section of a beam really gives the most resistance to a cross strain. To explain this, let ABCD be a beam



subject to a load W tending to break it across. It is plain the upper fibres are compressed, and the lower stretched, under the action of the load, and that there is a surface or plane somewhere between the upper and lower surfaces of beam not exposed to either strain, this being the "neutral surface." Now the depth *fe* is made up of a number of fibres, the resistance of which collectively to the two strains of compression and extension constitutes the actual strength of the beam; and their effective resistance is in proportion to their leverage distance from the neutral axis or plane, the leverage at the point *g* being nothing. It will also be clear that the fibres at *ab* and *cd* respectively will strain more under the load than those at 1, 2 and 3, 4; though, on the other hand, the greater leverage which the outer fibres *ab* and *cd* possess enables them to bear the strain quite as well as those at 1, 2 and 3, 4 with their shorter leverages. It is evident also that the stretching and crushing limits will be sooner reached at *cd* and *ab*. By the term fibre, any small part or fraction of the depth must be understood; and the greater the number of such fibres, or the greater the depth of beam, which are synonymous, the greater will be the sum of resistances. Thus the stress on any fibre is simply in proportion to its distance from the neutral axis, or the stress on 1, 2 is found by multiplying its distance from the neutral axis by itself, or in other words, by squaring its distance from the neutral line. It follows also that if the outer fibre *ab* which forms one side of the triangle *abg* represents a certain resistance to

crushing for the material, the relative strengths or resistances of the inner fibres at 1, 2 will be as their length within the same triangle. Thus the *squaring* of the *depth* of a beam is really the multiplying so many fibres, or its *depth*, by the leverage, which is the same as the depth; for example, the resistance of the fibre 1, 2 is its crushing strength multiplied by *ao*; for it is clear the crushing and tearing forces or resistances equally act in resisting the strain, though with different sectional areas determined by the ratio the material offers to crushing and tearing, which thereby shifts the position of the assumed neutral axis. The position of the neutral axis varies for different materials, therefore, and its determination may be thus arrived at approximately. Every material has its own crushing and tensile strengths, and it may be therefore assumed that, under ultimate fracture at least, the position of the neutral axis is that point where the proportion of crushing to tensile strengths defines it; though its exact position in a beam under mere strain has been a disputed point, yet it may be fairly assumed to lie somewhere midway between the top and bottom of beam, or the centre of gravity of the sectional area may be taken as its position. But in the case of actual yielding of the fibres under strain, it is clear those fibres will break first which can resist least, and the resistance will then be transferred to the other set of fibres which are stronger; and it is found a change in the position of the neutral axis takes place whereby so much of the sectional area of the strongest side of the beam is given up to the weaker side as there exists difference between the two resistances. From this it is evident there must be an equality of strain above and below the neutral axis. Now let us take Red Pine, for which in one table we get a tensile strength per square inch of 12,000lb. and a crushing strength of 5,400lb. per inch. Dividing 12,000 by 5,400 we get a ratio of 2.25 to 1 in round figures. Now we have only to represent these proportionate strengths graphically, that is, to make the distance *ab* in our diagram equal by any scale to the greatest quantity 2.25, and *cd* to equal 1; thus giving the greater area to the weaker strength or crushing and the smaller area to the greater strength or stretching resistance; and through those points draw lines as *ad* and *bc* crossing each other in a certain point, and that point will determine the neutral axis. It will be seen, also, if these proportions are drawn graphically, the triangular spaces enclosed by the lines will proportionately represent the sectional areas to resist crushing and tearing, and these will be equal forces. Again, as the fibres on the outer sides take the most strain, while those at the neutral axis have no strain, the average strains on the two sections of beam are found by finding the respective centres of gravity of the triangular spaces, or at one-third their heights from the outer lines; and by drawing lines parallel to the beam through those centres, the reduced average strains are found, by which their respective areas may be multiplied to determine the two forces called into requisition.

This is one case then, of many others, in which the value of ocular evidence is necessary to dispel the cloud of haze and uncertainty in which the student finds himself when surrounded with symbols and formulae he cannot fathom.

## THE BRITISH ASSOCIATION AT BELFAST.

## AN AGE OF COLOSSI.

MR. J. S. PHENE read a paper on Thursday, entitled "An Age of Colossi," in which he brought forward some instances of very similar customs between Egyptians, early people of America, and Chinese, the latter being in his opinion the most modern, and he argued that a great similarity of treatment and worship of the Nile and the Mississippi rivers, shown by the vast similitudes found along the margins of each, indicated that the very ancient constructors of these very similar designs on both rivers had a common or similar origin; hence, that it was probable that America was peopled by Western Asian emigration prior to the central parts of Europe, or even of Central Asia, as the facility for a coast line route would be much greater than an overland one to migratory people. He argued also from the emblems found at these distant points common religious worship among these distant people in the earliest times, sun and serpent worship being pro-

minent. After giving some facts as to an age of Colossi, he again brought forward, among some of the Colossi of Europe, those of the British Isles, natural as well as artificial, showing in several cases that where huge natural similitudes of the human form or countenance were apparent, there vast artificial figures (some in Britain being larger than any other representations in the world) were to be found, as the giant in Sussex, 240ft. high, and that in Dorsetshire 180ft., in the vicinity of the first there being a great sphinx-like head, an isolated rock, and reputed Celtic deity in the same county, and the vast human and other animal semblances on Dartmoor in the direction of the second. The great countenances in the white rocks near the Giant's Causeway appeared to have suggested similar simulations, as Pennant mentioned such a figure in the Isle of Arran, just opposite, and a great lithic representation of the human form still exists in Sligo. Other examples were given, including the Colossi of Easter Island, and of Elephanta, Ellora, and Bamian. In the case of the Dorsetshire giant, he considered it probable that Cæsar had seen this, as well as the figure at Wilmington, the one being, as he had before pointed out, near the place of his landing, the other on the way to Lidford, in the country of the West Britons, where, according to tradition, he and his army had been hospitably entertained, and he considered Cæsar's statement that the people had many such vast images thus sufficiently attested. Mr. Phene then referred to the evidence direct and indirect which he found beside the Dorsetshire giant in proof of the practice of cremation. His paper was illustrated by a number of drawings and photographs.

## PALESTINE.

On Monday a paper prepared by Lieutenant Conder, R.E., was read before the geographical section on the survey of Palestine. The country to which the present Ordnance survey is confined is known as Western Palestine. It is bounded by the Jordan and the sea, and extends from Dan to Beersheba. The desert shuts it off on the south, and on the north the line taken runs from the river Leontes to the sources of the Jordan. The country may be divided into five geographical districts. The hill country of Judea and the great plain of Sharon in the south, the country round Carmel, the hill country of Judea, and the Jordan valley. Of this vast extent of country little has hitherto been known. The work now being carried on consists in a regular trigonometrical survey to the 1 in. scale, of the whole country thus described, together with supplementary researches—antiquarian, Biblical, and physical. It was first commenced in October, 1871, by a party of Royal Engineers, consisting of two non-commissioned officers, under command of Captain Stewart, R.E. A severe illness obliged Captain Stewart to throw up the command, and Lieutenant Conder was appointed to succeed him. The principles of the survey may be briefly described. A base was carefully measured by a standard steel chain, and connected with the trigonometrical point of Jaffa. Lines were then extended eastward and connected with Major Wilson's point at Jerusalem. Thence it was carried north to the plain of Esdrallon, where a second base was established, the ends being marked by cairns. In this way a series of triangles were traced out. From each trigonometrical point a large number of observations are taken of all prominent objects, village towers, mosque domes, or prominent trees. The intersections of lines from different stations give secondary points. The work from each camp is then divided into four, and sheets of tracing paper are prepared on which the stations are fixed and the secondary points shown, the remaining details being filled in upon the ground by interpolation with the prismatic compass from observations taken at three or more of the fixed points. With practice, from eight to twelve miles per man can be accomplished in a day, the whole of the work being done on horseback. The collection and correct spelling of the original Hebrew names, which are found in Arabic under slightly modified forms, is a most important and anxious part of the survey, as tending to throw invaluable light on geographical passages in the Old and New Testaments. The names are obtained from natives belonging to the neighbourhood, and are checked by reference to at least three persons. They are written down in English, and afterwards pronounced in the presence of a competent Arabic scholar. The number of names already collected averages seven or eight times that on the best existing maps.



The natural history, geology, and physical geography is also noted. Every ruin or interesting site is visited. No less than 350 ruins are noted on a single sheet of the map. Special plans and surveys of Roman towns, temples, churches, synagogues, tombs, &c., number more than seventy. Seven churches have been added to those planned by Du Vogué. The interest of the country from a Biblical point of view consists in the identification of sites from etymological and literary argument. Amongst the interesting identifications made by the survey party may be mentioned that of the Kurn Switabeh as the altar "Ad;" the site of Arnon, where John baptised; Zaretan, in the Jordan Valley; the rock Oreb; the wine-press of Zeeb, mentioned in Judges; with the sites of Archelais, Ecbatana, Sozuza. Of the Romans, many interesting remains have been found, including the temple built by Herod and dedicated to Augustus. Of the troublous period after the destruction of Jerusalem, there are few topographical indications. The ages of Justinian and the Crusaders left many monuments—the two great convents of St. John on the Jordan, the traditional Gilgal, the Castel Pelegrino, where the pilgrims of the twelfth century first touched the soil of the Holy Land, and many forts and military positions. Of Saracenic works there are many fortresses, khans, mosques, and minarets. Four meteorological stations have been established, where barometrical and thermometrical observations are taken daily with great regularity. A full set of meteorological instruments is carried in each camp. The condition of the country, as regards vegetation, is also being noted, the general results showing that in seasons, rainfall, and natural vegetation, modern Palestine resembles very closely that of Biblical times. Careful attention is given also to the geological formation of the country. The Plains of Philistia, the southern shores of the Dead Sea, the ruins of Southern Judæa are yet to be explored in the South, whilst Phœnicia and the Sea of Galilee have as yet been unvisited in the North.

#### MULTIPLICATION OF MAPS AND PLANS IN THE FIELD.

A paper was read on this subject before the Geographical Section on Tuesday, by Capt. Abney, R.E., F.R.S.A., F.C.S.

It is of great importance to an army in the field that there should exist facilities for rapidly multiplying the results of reconnaissances, &c., in order that every officer concerned may be placed in possession of that information concerning the ground which goes far to ensure victory. Captain Abney considered the process of lithographic transfers to be open to several objections. He has succeeded in inventing an ink which is not greasy, and drawings made with which upon ordinary paper may be transferred upon stone or zinc. This ink, called after its inventor, has been adopted by the military authorities. Photolithography is useful whenever it is desirable to have enlarged copies of maps, so as to enable officers charged with reconnaissances to insert additional information upon them. Capt. Abney has invented a modified process of photolithography, which he considers to possess certain advantages for use in the field, and which he calls "papyrography." This process is applicable likewise to the multiplication of ordinary photographic views in half tone. These inventions of Captain Abney have been introduced into the British Army, which is now liberally supplied with printing appliances, each division taking the field being supplied with photographers, lithographers, and typographers' waggons, with stores sufficient for a three months' campaign.

Major Hotchkiss, of Virginia, who for four years had charge of the topographical department of the army of Northern Virginia, under Stonewall Jackson, said the accidental details were often overlooked on surveys, though on them might depend the result of a battle. During the American war the issue of one great battle was the result of a projecting ridge of limestone only 18in. high behind which the Confederates sheltered themselves. He advocated the use of coloured crayons which in America were found very useful.

A new Roman Catholic Chapel was opened at Husbands Bosworth on the 15th inst. The chapel consists of a nave and chancel. There are seats for 100 persons, besides a gallery at the west-end. The altar, reredos, and tabernacle are by Messrs. Firth, and the brass altar standards by Messrs. Braun, of Birmingham.

## Civil Engineering.

**THE ADMIRALTY PIER, DOVER.**—This important work, which has been for so many years in course of construction, is now nearly completed. Workmen are engaged in finishing the roadway, the tramway, the iron railings, and the upper gallery, while the remainder of the stone-work on the western side of the pier is well in hand. But at the head of the pier another work is in progress which must occupy some time. Bricklayers are now constructing below the level of the roadway of the pier the extensive basement of the fort which is to defend the entrance to the harbour; this fort is to have a revolving turret, is to be armed with one of the heaviest guns, and protected with armour-plates.

**THE NEW WET DOCK AT LEITH.**—Several months since the Commissioners for the Harbour and Docks of Leith decided upon the construction of a new wet dock to the east of the Albert Dock. The contractor for the work, Mr. Scott, is now preparing to commence the construction of the reclaiming bank. This wall will run seaward from the eastern extremity of the north wall of the Albert Dock for a distance of 200ft., and then form a straight line 1,770ft. in length, parallel with the present dock, thence running shorewards to a point within 100ft. of Seafield Tollhouse. The north wall of the dock proper will be in a line with the sea wall of the Albert Dock, and will be 1,500ft. in length, while the breadth of the dock will be 650ft., which is 200ft. greater than that of the Albert Dock. A jetty, 1,000ft. in length and 250ft. in breadth, will run into the centre of the dock from the east side. The total quayage accommodation will be 6,240ft., which is double the extent available in the Albert Dock. From the dock floor the walls will be 35ft. in height, and will be formed of freestone from Craigmillar Quarry, bound together with Portland cement. The sea walls will be carried 3ft. higher, and will be constructed of rubble, faced with large blocks of freestone. The entrance to the dock will be from the east end of the Albert Dock, by an open channel 65ft. wide and 300ft. long, which will be spanned by a hydraulic swing bridge 126ft. in length. The dock will be approached by a roadway, 60ft. wide, from Salamander-street, in continuation of Bath-street. A road of the same width will run along the south side of both docks, the ground on its north margin affording space for sheds, and that on the south being available for feuing purposes. Another road will be constructed along the reclaiming wall, from the Seafield Tollhouse to the docks, to facilitate the Portobello traffic. The present goods station of the North British Railway Company will be vacated, and will be available for building sites, and in lieu thereof the ground reclaimed beyond the dock will be placed at their disposal. A roadway sloping to the sea will be formed at the junction of the Albert with the new dock, to give facilities for the loading and unloading of ballast. The dock will, on its completion, be furnished with sheds and cranes, the latter of which will be worked by hydraulic power. The dock works will, it is expected, cost £250,000, and £50,000 more will be necessary to supply the furnishings. Mr. Scott, who was the contractor for the Albert Dock, has been bound by the terms of his agreement to complete his present undertaking within five years.

**THE NAVIGABLE CHANNEL OF DUNDALK.**—On Monday a paper was read before the British Association at Belfast by Mr. Thomas Neville, C.E., M.R.I.A., on the means adopted for the improvement of the navigable channel of Dundalk. The paper stated that the harbour of Dundalk is entered by a channel four miles long from and in the bay, beginning at the bar and terminating at Soldier's Point. This channel, called the "outer channel," discharges the waters of the Castletown River at low water. In 1867 it had shifted so much that it became necessary to alter its course and fix it. A plan for this purpose was selected by the Harbour Commissioners, and approved of by the Board of Trade. This consisted of directing the ebb and flow currents into a more direct course, and fixing this course by means of jetties and side-walls constructed of loose rubble boulder stones, varying in weight from a few pounds to a few cwt., dropped in from punts, and raised about 2ft. over low water neap tides. These stones were not quarried, but picked from off the lands on the mountain side, near the shore, carted to the shipping places

by the farmers, and sent out in punts. About 60,000 tons have been deposited up to the present time; about two miles of jetties and walls have been constructed, and about £8,000 expended out of an estimate of £40,000. As the income of the Commissioners is limited, the works are carried on from time to time to meet the available funds. It was at first thought by many that at a distance of a mile or two from the shore these jetties and walls would be washed away. This has not been so. Not a single stone has been removed, but when subsidence takes place new materials are supplied, and the walls raised up from time to time as before. The jetties were used to force back the channel gradually, in some cases to an extent of about 700ft., without any interruption of the navigation. He had brought this communication before the Association for the purpose of showing that guide walls, if not too high, can be constructed with small stones in a cheap and effective way, to direct the currents and maintain a channel at a considerable distance from the shore in other bays and estuaries. Mr. Schoolbred, C.E., considered the Association were indebted to Mr. Neville for his paper. In illustration of what Mr. Neville pointed out, he mentioned that at the entrance to the River Avoca, at Arklow, a wall had been constructed running out to the channel, and it was found that the further the pier was extended the greater was the accumulation of sand. At Bayonne an immense sum of money had been expended in continuing the walls out, with a similar unfortunate result. He (Mr. Schoolbred) believed there were two places on the Bay of Biscay where considerable sums had been expended in constructing walls of this description; but, no matter how far the walls were extended, the bar always appeared. As to the particular class of wall he had referred to, he had seen a very successful application of them. At Bordeaux the River Garonne was very wide, and it was found absolutely requisite to get a good channel instead of a simple tide channel. He considered that the most important statement, in an engineering point of view, made by Mr. Neville, was, that in the course of his operations he had not been inconvenienced by the bar in Dundalk.

#### SOMERSET ARCHÆOLOGICAL SOCIETY.

**THE** twenty-sixth annual meeting of the Somerset Archæological and Natural History Society was held in Sherborne and the neighbourhood last week. The proceedings commenced with a business meeting at the Town-hall on Tuesday, the President for the past year (the Bishop of Bath and Wells) in the chair. Mr. H. D. Seymour, of Trent, was elected President for the ensuing year, and Messrs. Badcock, of Taunton, were re-elected treasurers, and the hon. secretaries (Rev. W. Hunt and Mr. O. W. Malet) were also re-elected. Mr. Malet read the report of the Council, in which it was announced that Taunton Castle had been purchased for £2,850, of which £1,350 had been raised by subscriptions, the balance (£1,500) having been borrowed. In order to reduce this debt, it was proposed to hold a fancy bazaar, exhibition of works of art, concert, &c., at Taunton next Spring. The report was adopted, and the curator of the Museum at Taunton Castle (Mr. W. Bidgood) was re-elected. Mr. F. H. Dickinson, of Kingweston, having referred to the necessity of taking steps to render the valuable documents connected with Wells Cathedral more easily accessible, Mr. Serel, of Wells, read an interesting paper on the Vicars' Close at Wells, and urged that something should be done to urge the Ecclesiastical Commissioners to preserve the buildings intact, instead of selling them piecemeal, as there was reason to fear they would do. It was decided to refer the matter to a committee. The President (Mr. H. D. Seymour) then delivered an address. After remarking that there was no archæological society in Dorsetshire, he expressed a hope that ere long an association similar to their own might be founded in the county, or that steps might be taken to enable local archæologists to join the Somerset Society. Dorsetshire, he said, possessed very many objects of interest, including the beautiful churches of Wimborne and Sherborne, the remains of John of Gaunt's palace at Canford, the ruins of Corfe Castle, the splendid hall of Milton Abbey, and a few remains where once stood the celebrated abbey of Shaftesbury. In Somersetshire, the taste and wealth of Glastonbury and other abbeys had made the most



of the beautiful materials for building with which the district abounded, and had left, both in ecclesiastical and domestic architecture, edifices of consummate beauty, heightened by the charm of antiquity. The company having partaken of luncheon, re-assembled in the grounds of the Old Castle, where Mr. G. T. Clark, of Dowlais, explained the architectural features of what now remains of the once-famous stronghold—the moat, the keep and its curtain walls, the chapel, the great hall, and other domestic buildings, and gave a general outline of the history of this “fortified palace.” Dr. E. A. Freeman also made some remarks on the same topic, and one or two doubtful points as to the date of certain portions of the building were dilated on by Mr. J. H. Parker, C.B., of Oxford. The members and friends, to the number of 80, dined at the Digby Hotel, and afterwards adjourned to the Townhall for the purpose of hearing papers read. The first was by Mr. E. A. Freeman, D.C.L., the subject being “King Ine.” He commenced by explaining that the diocese of Wells was a fragment cut off from the older diocese of Sherborne, and that the Church of Wells was the daughter of the elder Church at Sherborne, just as the latter was the offspring of the yet more venerable Church of Imperial Winchester. The Church and Bishopric of Sherborne—the Church of Ealdhelm and his successors—was, the lecturer continued, the greatest ecclesiastical creation of Ine. After pointing out features of resemblance between the Abbey Church and the churches at Bath, Taunton, Huish Episcopi, Glastonbury, Martock, and other places, he gave an outline of the history of Ine as an ecclesiastical founder, dealing more especially with his connection with Sherborne. The Rev. W. Barnes, of Came, followed with an interesting paper on Ealdhelm.

On Wednesday morning the proceedings commenced at 10 o'clock, the place of assembly being the Abbey Church at Sherborne. Under the guidance of Mr. E. A. Freeman the visitors proceeded to inspect the grand old edifice. Taking up a position at the south-west of the churchyard, Mr. Freeman described the main features of the building as it now stands. It was, he said, a Norman building rebuilt and recast, and become Perpendicular. The church had, he said, been restored, and as Professor Willis was satisfied with the manner in which the work had been done (with the single exception of an attempt to modernise the Norman south porch) he should not grumble with it. Mr. Freeman then led the way to the interior, where he called attention to the principal points of interest. The visitors then proceeded to the grounds of the King's School, where an elaborate paper was read by Mr. R. Herbert Carpenter, architect, of London, who dealt with the history of the school from the time of its foundation, special attention being paid to the many improvements recently carried out, a considerable portion of the work having been done under the superintendence of Mr. Carpenter's father. The visitors then proceeded to the Vicarage and Almshouse, both of which were described by Mr. J. H. Parker. At 1 o'clock the visitors proceeded in carriages to Clifton Maybank, where they inspected the old Manor House, the architecture of which was explained by Mr. Parker, its history being dealt with by the Rev. F. Brown and Mr. J. Batten. The next halt was at Bradford Abbas, where the church was visited and described in a brief paper by Mr. Carpenter. Mr. Parker pointed out many features of great interest, directing special attention to the tower, the unique little porch on the south side, the elegant font, the remarkable chantry chapel, the curious roof (which Mr. Carpenter said had the peculiarity of being “of no construction at all”), a muniment chest cut from a solid piece of oak, and some quaint carvings. Mr. King, of Bradford, and Mr. Shout, of Horsington, also gave some information respecting the building, which, it was generally admitted, was an “architectural gem.” The party then proceeded to Melbury, where, by the kindness of the Earl of Ilchester, the park and mansion were thrown open to visitors, who rambled at pleasure through the splendidly-furnished apartments, inspecting the magnificent paintings by Rembrandt, Rubens, Guido, Poussin, Salvator Rosa, Cuyp, Ruysdael, and other masters. The curious little church at Melbury having been visited, another pleasant drive brought the company to Yetminster, where the chief object of interest was the parish church of St. Andrew, which has been most zealously guarded from modern restorers, and abounds in interesting features. Having partaken of tea at

the Vicarage, the party returned to Sherborne, where after dinner, there was a meeting at the Townhall for the reading of papers. A geological paper, prepared by Professor Buckman, “On the Lands at Bradford Abbas” was read (in his absence) by the Rev. H. H. Winwood. Mr. John Batten, of Yeovil, read a paper “On the History of Trent,” and Mr. G. T. Clark having made some remarks respecting Trent Barrow, the meeting terminated.

On Thursday morning a start was made soon after ten o'clock, the first halting-place being Poynton, where the parish-church was visited. The building is a combination of modern and ancient architecture, a new apse having been added to what remains of a very old and interesting building. The principal features of the ancient structure—the Norman font, the piscina, squint, Norman porch, waggon-headed roof, and square-headed Decorated windows of the north aisle—were pointed out by Mr. Parker. A long paper on the genealogy of the Malet family having been read by Mr. O. W. Malet, the Rev. J. Heale, rector of Poynton, gave a history of the parish. The fine old Manor Houses were then visited, after which the party proceeded to Sandford Orcas, where a brief visit was paid to the church, the chief object of attraction being the fine old Manor House, over which the company was taken by the owner, Mr. Hutchings, who also provided refreshments in the great hall. The party then drove along tree-embowered roads, by way of Sparkford, to Chilton-Cantelo, where the fine tower of the time of Henry VII., and the restored church of St. James, were inspected and admired. Mr. Parker describing the restoration as a “real, conscientious one.” The Provost of Eton detailed the progress of the work of rebuilding, and gave a description of some mural paintings found in the north transept, illustrative of the death, burial, assumption, and coronation of the Virgin Mary. The next halt was at Trent, where the church was visited; and Mr. Parker and Mr. J. Batten having made some remarks respecting the building and the lords of the manor, the company, to the number of about 200, were entertained at luncheon by the President in a large marquee, and so terminated a most successful and interesting three-days' meeting. During the meetings of the society a room at the Townhall was set apart as a temporary museum, which contained a large number of interesting articles, and added in no small degree to the success of the meetings.

#### ARCHÆOLOGICAL DISCOVERIES IN INDIA.

THE *Hour* has been favoured with the following copy of General Alexander Cunningham's Report on his recent discoveries. In selecting certain extracts for publication, Professor Max Müller prefaced them by saying that “Indian archæologists owe already a large debt of gratitude to General Cunningham, but it is not too much to say that his latest excavations may inaugurate a new era in the history of Indian scholarship.”

#### MEMORANDUM OF THE OPERATIONS OF THE ARCHÆOLOGICAL SURVEY OF INDIA FOR THE SEASON 1873-74.

During the working season which is just now closed, the greater part of the Central Provinces has been explored by my assistant, Mr. Beglar, and myself, he taking the eastern half and I the western half—the division being broadly marked by the high road through Jabalpur and Seoni to Nagpur. At Jabalpur we examined together the old temple at Bhera Ghât, overhanging the marble rocks. The present temple is small, and apparently a reconstruction of part only of the original building; but the circular colonnade which surrounds the temple, with its long line of female statues, all of life-size, is one of the most curious and perfect specimens of Hindu architecture that I have yet met with. The temple and its surrounding statues are dedicated to the worship of Siva; but from the discovery of a single small statue with the well-known Buddhist creed, “Ye Dhamma hetu,” &c., inscribed on the pedestal, I have little doubt that this circular colonnade must originally have inclosed a Buddhist stupa. Each of the female statues has the name engraved on the pedestal, and from the shapes of the letters of these records I would assign the destruction of the Buddhist works and the establishment of the Saiva temple to the ninth

or tenth century. To the north of Jabalpur I explored the ruin temples of Bilahari and of Karpur near Kari Talai, and obtained good copies of the Asoka inscription on the rock at Rupnath. Through the kindness of Mr. C. Grant, Commissioner of Jabalpur, I obtained two copper-plate inscriptions containing a land grant of Raja Jayanatha, dated in Samvat 174, which were found at Karpur. To the west of Jabalpur I explored the decayed city Burhanpur, where I made plans of the Jami and Bibi Masjid—the former being one of the finest Muhammadan buildings in India. It contains a long inscription of Adil Shah Faruki, with a Sanskrit translation, and also a record of Akbar, mentioning his conquest of Khandes and the Dakhin. From Asirgarh I got a second similar record of Akbar, with an inscription of his son Daniyal, and others of Shah Jahan and Aurangzib. To the South I explored the Buddhist caves and Brahmanical temples at Bhandak, to which place I am now able to restore a long and valuable inscription of the sixth or seventh century, the find-spot of which was unknown. I visited also the colossal sculptures at Lalpet, outside the walls of Chanda, of which the largest measures no less than 26½ ft. in length by 18 ft. in breadth, and 3 ft. in thickness at the base. I calculate its weight at upwards of 80 tons. The sculpture represents the goddess Durga, with ten heads, ten arms, and ten legs. On the pedestal there is a bas-relief of Siva performing tapasya, or ascetic penance. Fifty miles to the eastward of Chanda, and about 120 miles to the south of Nagpur, I visited the famous group of temples at Markanda, on the Wen-Ganda River. The principal temple of Markanda Rishi is of the same type as the great temples at Khajuraho in Bundelkhand, the outside being decorated with three rows of statues below and four rows above. Unfortunately this temple was struck by lightning about 200 years ago, which destroyed the upper half of the tower and the roofs of the mahamandapa, or main hall, and its side porches. The temple was dedicated to Siva. It is surrounded by about a dozen other temples of the same god under different titles, with a long cloister temple in the back wall of the enclosure, which is dedicated to the ten Avatars of Vishnu. The sculptures are of the same style as those of Khajuraho, but without their indecency. The temples may be assigned to the ninth and tenth centuries, but there are remains of former buildings, as well as a broken pillar with an inscription of an earlier date. On the northern frontier of the Central Provinces I explored the small States of Mahiyar (Myhere) and Nagod. In the former State there is an old temple dedicated to Saraswati, on the top of a lofty conical hill, three miles to the west of the town. The enshrined figure of the goddess has an inscription of four lines on the pedestal, and outside there is a long inscription of thirty-nine lines which is unfortunately much worn by the weather. It opens with an invocation to Saraswati. In the State of Nagod, which was formerly called Uchahara, there are several ancient sites, one of which, named Dhaniya-Majgowa, has yielded a number of copper-plate inscriptions, of which eight are now in the possession of the Raja of Nagod. These records belong to two different families of petty chiefs, of whom the principal representatives are Raja Hastina and his sons Sakshabhana and Sarvvanatha in one line, and Raja Jayanatha and his son Sarvvanatha in the other line. At Bhubhara, twelve miles to the west-north-west of Uchahara, I obtained a short record of the last-named prince, inscribed on a stone pillar. But the most interesting remains are at Bharhut, six miles to the north-east of Uchahara, nine miles to the south-east of the Sutna railway-station, and 120 miles south-west of Allahabad. In our maps the place is called Bharad, and I believe that it may be identified with the Bardaetis of Ptolemy. It is the site of an old city, which only sixty years ago was covered with a dense jungle. In the midst of this jungle stood a large brick stupa, 68 ft. in diameter, surrounded by a stone railing 88 ft. in diameter, and 9 ft. in height. The whole of the stupa has been carried away to build the houses of the present village; but more than half of the stone railing still remains, although it has been prostrated by the weight of the rubbish thrown against it when the stupa was excavated. When I first saw the place only three of the railing pillars near the Eastern gate were visible above the ground, but a shallow excavation soon brought to light some of the pillars of the south



gate, from which I obtained the measurement of one quadrant of the circle. I was thus able to determine the diameter of the enclosure, the whole of which was afterwards excavated, partly by myself and partly by my assistant, Mr. Beglar. In many places the accumulation of rubbish rose to 8ft. in height, and, as the stone pillars were lying flat underneath this heap, the amount of excavation was necessarily rather great; but the whole work did not occupy more than six weeks, and all that now exists of this fine railing is now exposed to view. This colonnade of the Bharhut stupa is of the same age and style as that of the great Sanchi stupa, near Bhilsa. But the Sanchi railing is quite plain, while the Bharhut railing is profusely sculptured—every pillar and every rail, as well as the whole coping, being sculptured on both faces, with an inscription on nearly every stone. From the characters of these inscriptions, as in the similar case of the Sanchi stupa, the erection of the railing must be assigned to the age of Asoka, or about B.C. 250. The inscriptions are mostly records of the gifts of pillars and rails, like those of the Sanchi and other stupas. But there are also a considerable number of descriptive records, or placards, placed either above or below many of the sculptures. These last are extremely valuable, as they will enable us to identify nearly all the principal figures and scenes that are represented in these ancient bas-reliefs. Amongst the numerous sculptures at Bharhut there are no naked figures, as at Sanchi and at Mathura, but all are well clad, and especially the women, whose heads are generally covered with richly-figured cloths, which may be either muslins, or perhaps brocades or shawls. Most of the figures, both male and female, are also profusely adorned with gold and jewelled ornaments, in many of which one of the most significant Buddhist symbols plays a prominent part. The earrings are mostly of one curious massive pattern, which is common to both men and women. The ankus, or elephant goad, was also a favourite ornament, which is placed at intervals in the long necklaces of ladies. At each of the four entrances the corner pillars bore statues, each 4½ ft. in height, of Yakshas and Yakshinis and of Naga Rajas, to whom the guardianship of the gates was entrusted. Thus, at the northern gate there are two male figures and one female, which are respectively labelled Ajakalaka Yakho, Kupiro Yakho, and Chanda Yakhi, that is, the Yakshas named Ajakalaka and Kupira, and the Yakshini Chanda. Other Yakshas are named Suviloma, Virudaka, and Gangito, and a second Yakshini is labelled Yakshini Sudasana. On two other pillars there are male figures, each with a hood canopy of five snakes' heads and each labelled Naga Raja. These have their arms crossed upon their breasts in an attitude of devotion appropriate to their appearance on a Buddhist building. On two middle pillars there are two female statues respectively labelled Chukaloka Devata and Sirima Devata, whom I take to be goddesses. Amongst the scenes represented there are upwards of a dozen of the Buddhist legends called Jatakas, all of which relate to the former births of Buddha. Luckily these also have their appropriate inscriptions, or descriptive labels, without which I am afraid that their identification would hardly have been possible. Amongst these Jatakas are the following:—

1. Hansa Jataka, or "Goose-birth," of which the only portion now remaining below the inscription is the expanded tail of a peacock, which must therefore have played some part in the story.

2. Kinara Jataka.—The Kinaras were a kind of demi-gods. Here two of them, male and female, are represented, with human heads and clad in leaves, standing before some human personage who is seated. The assignment of horses' heads to the Kinaras must therefore belong to a later date.

3. Miga Jataka, or the well-known legend of the "Deer," in Miara Sanskrit Mriga.—I call it a deer and not an antelope, as is generally understood, because all the animals in this bas-relief are represented with antlers. The King of Kasi is seen aiming an arrow at the King of the Deer (Buddha).

4. Magha-Deviya Jatakam, or "Magha Devi birth."—Magha Deva was a king, who on being shown his first grey hair was so struck with the instability of human life that although he had still 84,000 years to live he embraced religious life at once, and became a recluse.

5. Yava Majhakiyam Jatakam.—This title means literally the "mean or average amount of food" which was attained by daily increasing the quantity with the waxing moon and decreasing it with the waning moon. I know nothing of the story, but the bas-relief shows a king seated with baskets of grain (?) before him, each bearing a stamp or medallion of a human head. To the left some men are bringing other baskets. Barley (yava) would appear to have been the principal food in those days.

6. Bhisaharaniya Jataka.—A rishi (or sage) is seated in front of his hut, with a man and woman standing before him, and a monkey seated on the ground, who is energetically addressing the sage.

7. Latuwa-Jatakam: the "Latwa-bird-birth."—This legend apparently refers to some story of a bird and an elephant, of which I heard a curious version in Kashmir in 1839. In the bas-relief there is a bee stinging the eye and a bird pecking the head of an elephant, with a frog croaking close by, while the elephant is treading on a nest of young birds. To the right the same (or a similar) bird is sitting on the branch of a tree over an elephant, who is running away with his tail between his legs. Near the top the hind half of an elephant is seen rushing down some rocks. In my Kashmiri version an elephant, while feeding, throws down a nest of young birds into a stream, where they are all drowned. The parent bird seeks the aid of the bees and mosquitoes, who attack the elephant with their stings, and having half blinded him he rushes off towards the stream, and plunging headlong down the rocks is drowned. The fable seems intended to show the power of combination. There can be no doubt that the two legends are substantially the same; and it seems probable that we may find other Buddhist Jatakas still preserved in modern legends after the lapse of more than 2,000 years. Perhaps this particular legend may be found in the Pancha Tantra.

8. Vitura punakaya Jatakam.—I know nothing of this story. Vitura may perhaps be a mistake for Vithura, "a thief." Of illustrations of the life of Buddha during his last appearance there are some good examples. The earliest of these is a medallion containing Maya's dream of the white elephant, which is superscribed Bhagavato Ukdanti. A second scene belongs to the reign of Ajata Satru, King of Magadha, in the eighth year of whose reign Buddha attained Nirvana. This is labelled.

Ajatasata Bhagavato vandate.—Some of the well-known assemblies of the Buddhists would also appear to be represented, of which one is called the Jatila Sabha, of which I know nothing. A second belongs, I think, to a later period of Buddhist history, about midway between the death of Buddha and the reign of Asoka. This sculpture represents a large assembly, and is duly labelled.

Sudhamma Reva Sabha Bhagavato Chuda Maha.—The words Reva Sabha I take to mean the assembly or synod, which was presided over by the famous Buddhist priest, Revato, just 100 years after the death of Buddha, or in B.C. 378. But the Bharhut sculptures are not confined to the legends and events connected with the career of Buddha, as there is at least one bas-relief which illustrates a famous scene in the life of Rama. In this sculpture there are only three figures, of which one seated to the left is holding out an arrow towards a male and female who stand before him—the latter being behind the other. These figures are labelled respectively Rama (the rest lost, but most probably Chandra), Janaka Raja, and Sitala Devi. I believe this is by far the earliest notice that we possess of the great solar hero, Rama, and his wife. I look upon the discovery of these curious sculptures as one of the most valuable acquisitions that has yet been made to our knowledge of ancient India. From them we can learn what was the dress of all classes of the people of India during the reign of Asoka, or about three-quarters of a century after the death of Alexander the Great. We can see the Queen of India decked out in all her finery, with a flowered shawl or muslin sheet over head, with massive earrings and elaborate necklaces, and a petticoat reaching to the midleg, which is secured round the waist by a zone of seven strings, as well as by a broad and highly ornamental belt.

Here we can see the soldier with short curly hair, clad in a long jacket, or tunic, which is tied at the waist, and a dhoti reaching below the knees, with long boots, ornamented with a tassel in front just like Hessians, and armed with a

straight broad sword, of which the scabbard is three inches wide. Here also we may see the standard-bearer on horseback with a human-headed bird surmounting the pole. Here, too, we can see the king mounted on an elephant, escorting a casket of relics. The curious horse-trappings and elephant-housings of the time are given with full and elaborate detail. Everywhere we may see the peculiar Buddhist symbol which crowns the great stupa at Sanchi used as a favourite ornament. It forms the drop of an earring, the clasp of a necklace, the support of a lamp, the crest of the royal standard, and the decoration of the lady's broad belt and of the soldier's scabbard. There are also houses of many kinds, and several temples, one of which is labelled Vijayata pasade, or the "Temple of Victory." There are animals of several kinds, as elephants, horses, deer, cows, and monkeys, and a single specimen of a real tapir. There are numerous crocodiles and fishes, and in one sculpture there is a very large fish, which is represented swallowing two boat-loads of men. There is also a great variety of flowers, and several kinds of fruits, amongst which the mango is very happily treated. But perhaps the most curious of the Bharhut sculptures are a few scenes of broad humour, with elephants and monkeys as the only characters. In two of these an elephant has been captured by a band of monkeys, who have fastened a billet of wood along the inside of his trunk so as to prevent him from moving it. Ropes are fastened to his neck and body, the ends of which are pulled by monkeys, who are walking and dancing in triumphal procession to the sound of shells and cymbals played by other monkeys. The spirit of these scenes is very droll. A third scene represents the monkeys holding a giant by the nose with a pair of pincers, to which is fastened a rope dragged by an elephant. The action and attitudes of the monkeys are very good. The intention of all these designs is exceedingly spirited, but the execution is coarse and weak. In the short inscription on the railing of the Bharhut stupa I find the names of the following places: Sugana, or Srughna; Vedisa, or Besuager, near Chilisa; Pataliputra, or Patna; Kosambi, or Kosam; Nandinagarika, or Nander; and Nasika, or Nasik; besides a number of unknown places, of which Asitamasa is most probably some town on the River Tamasa or Tamas, the Tons of our maps. From these inscriptions also I have learned the names of several parts of the Buddhist gateways and railings, one of which is a new word, or at least a new word of form, not to be found in the dictionaries. On the top of Lal Pahr, or the "Red Hill," which overhangs Bharhut, I obtained a rock inscription of one of the great Kalachuri Rajas, Nara Sinha Deva, dated in Samvat (Sake) 900. Altogether Mr. Beglar and I have collected about twenty inscriptions of the Kalachuris, who took the titles of Chedindra and Chedinarendra, or "Lord of Chedi," and called the area which they used the Chedi Samvat and the Kalachuri Samvat. I have also got an inscription of the great Chalukya Raja Tribhuvana Malla, who began to reign in A.D. 1076 and reigned 51 years. The inscription is dated in Sake 1008, or A.D. 1086, and the place of its discovery, Sitabaldi, confirms the account of his having conducted an expedition across the Narbada. After leaving Bharhut I visited Kosam on the Jumna, which I have formerly identified with the ancient Kosambi. I explored the places very minutely, and my three days' search was rewarded by the discovery of several very curious terra-cotta figures, which are certainly as old as the period of Buddhist supremacy, as the common Buddhist symbol forms an ornament, both for males and females, as in the Bharhut sculptures which I have just before described. Unfortunately there are no inscriptions upon them. Some of them are undoubtedly toys. Such are two rams' heads with a hole from side to side for an axle, and a hole at right angles behind for the insertion of a pole, so that they might be rolled forward on wheels to butt against each other. Such also are four carts or chariots with similar perforations, and with harnessed oxen represented on the fronts. One of them has four oxen, the others only two. These I take to be authentic specimens of the ancient toy-cart, or Mrichchhakati, which gave its name to one of the oldest of the Hindu dramas translated by H. H. Wilson.

Bharhut.—A further examination of the inscriptions, and the receipt of Mr. Beglar's report of the completion of the excavations, have made several very valuable additions to my account of



the Bharhut sculptures, of which I will now give a brief description. A bas-relief, labelled with the name of Pasenajita, shows the well known King of Kosala in a chariot drawn by four horses proceeding to pay his respects to the Buddhist Wheel symbol, which is appropriately named Bhagavato dhamma chakam. A second bas-relief represents a Naga chief kneeling before the Bodhi tree, attended by a number of Naga followers. This scene is named "Erapato Naga Raja Bhagavato vandate," that is "Erapatra, the Naga Raja, worships Buddha."

The following jatakas have also been found by Mr. Beglar:—(1) Uda Jataka, (2) Sanchha Jataka, (3) Birila (read Birala) Jataka, i.e. "the cat and the cask" (or) Kukuta Jataka—(4) Ishmbio Jataka, (5) Naga Jataka, and (6) Chhadantiya Jataka.

A single bas-relief gives a party of female dancers attended by female musicians. The attitudes are the same as at the present day; but the four female dancers are intended for Apsaras, as they are separately labelled, Alambusa, Achhara, Subhada Achhara, Padumavati Achhara, and Misakosi Achhara.

There are also representations of five separate Bodhi trees of as many different Buddhas, which are distinctly labelled as follows:

1. Bhagavato Vipassino Bodhi, that is, the tree of Vipassin or Vipaswi, the first of the seven Buddhas.
2. Bhagavato Kakusadhasa Bodhi.
3. Bhagavato Konagamans Bodhi.
4. Bhagavato Kasapasa Bodhi.
5. Bhagavato Sakamunino Bodhi; also
6. Wesabhu or Viswabhu's Bodhi.

These last are the four well-known Buddhas named Krakuchhanda, Konagamani, Kasyapa, and Sakyamuni.

But by far the most interesting of all Mr. Beglar's discoveries is a bas-relief representing the famous Jetavana monastery at Sravasti. The scene is labelled "Jetavana Anadhapediko dati koti sanhatena keta," which I take to mean that "Anathapindika buys (keta) the Jetavana for certain kotis of money." To the left there is a building labelled Kosambikuta, a name which has already appeared in my Sravasti inscription. A second building near the top is labelled Gadhakuti or Gandhakuti. In the foreground there is a cart which has just been unladen, with the pole and yoke tilted upwards, and the bullocks at one side. The story of the purchase of Prince Jeta's garden by Anathapindika for eighteen kotis of masurans is told in Hardy's Manual of Buddhism, p. 218. According to the legend, Prince Jeta, not wishing to sell the garden, said that he would not part with it for a less sum than would pave the whole area when the pieces of money (masurans) were laid out touching each other. This offer was at once accepted by Anathapindika, and accordingly the courtyard is represented covered with ornamented squares, which touch each other like the squares of a chess-board, but do not break bond as a regular pavement of stones or tiles would do. For this reason I take the squares to represent the square pieces of old Indian money. Besides the cart there are two figures with pieces in their hands. These I suppose to be Anathapindika himself and a friend counting out the money. In the middle of the court are two other figures also with square pieces in their hands. These I suppose to be the purchaser's servants who are laying down the coins touching each other. To the left are several persons of rank looking on, whom I take to be Prince Jeta and his friends. The whole scene is very curious; and when we remember that the bas-relief is as old as the time of Asoka, it does not seem too rash to conclude that we have before us a rude representation of the buildings of the famous Jetavana which were erected by Anathapindika during the lifetime of Buddha. One of the new inscriptions discovered by Mr. Beglar is also interesting, as we get the name of a king who must have been a contemporary of Asoka. This record is as follows: "Gift of the Prince Vadha Pala, son of Raja Dhanabhuti."

A. CUNNINGHAM, Major-General,  
Director-General of the Archaeological Survey of India.

Last week, under a faculty from the Ecclesiastical Commissioners, and by virtue of the City Improvements Act, the demolition of the church of St. James's, Duke's-place and the removal of the bodies was completed.

#### ARCHÆOLOGICAL.

ANCIENT CITIES IN ARIZONA.—Some interesting discoveries have recently been made in the ruins of ancient cities in South Arizona. According to the *Alta California* paper, the Pueblo Viejo Valley, between the Graham mountains and the Gila river, which is about sixty-four miles long and four wide, has a chain of well-marked ruins of ancient cities about a mile apart. Some of the walls still show above the surface, and mounds from 10ft. to 40ft. in height are seen covered with vegetation. The walls are of rough stone laid in mortar. Pottery, household utensils, and human bones, have been found, besides several jug-shaped earthen vessels containing ashes, small pieces of bones, and fragments of charcoal. Axes, hammers, and sledges of various shapes, and made of stone, harder than any now discovered, have also come to light. The pottery is glazed and covered with lines and characters of different colours to the grey ground. In each city a triangular-shaped reservoir of about three to five acres is found. These are connected, and also with the Gila river, by a large canal. The edges of reservoirs and canals are laid with stone. These cities are, from the rubbish, supposed to have been destroyed by fire, though their inhabitants are unknown. On the banks of the Gila river are the ruins of a building measuring 57ft. by 51ft., built of "adobe," a very hard material. The walls appear as a building within a building, and a space of 10ft. or 12ft. between. The walls are 30in. thick at base. In the walls, about 9ft. from the ground, a row of cedar beams are built, which appear as if they were consumed by fire. In one place three stories are still standing. Windows are long and narrow, without regard to symmetry externally. The walls show a yellowish white and perfectly smooth plastering. Cedar posts, set on very accurate lines, are also found near. Examples of the same class of ruins are found all over South Arizona, New Mexico, and North Mexico.

BARROW EXPLORATIONS IN YORKSHIRE.—During the past week the Rev. Canon Greenwell, of Durham, and Professor Rolleston, of Oxford University, have attacked a series of barrows on the Hambleton Hills. A long barrow produced five very much decomposed and previously dislocated bodies, and no entire one, which was strange, and looked as if all had been interred at some other place, and afterwards laid where found. All were at the east end, as has been invariably the case with the long barrows. A large round barrow produced two burnt bodies, one man urn, greatly damaged by rabbit digging. There was no trace of a primary burial, but the remains of birch branches were abundant.

EXPLORATION OF SETTLE CAVES.—At a sectional meeting of the Archaeological Association last week, Mr. R. H. Tiddeman read a report by the committee for assisting in the exploration of the Settle Caves. The Victoria Cave had received principal attention from the explorers. A few bones had been found, and a large fragment of one appeared to be that of an elephant. Several bronze articles were discovered, and other objects of interest. It appears, also, that in 1872 a human bone was found at a depth of 20ft. from the surface of the lower cave. The committee were instructed to continue their explorations.

THE OASES OF THE LIBYAN DESERT.—In a paper contributed by Dr. G. Schweinfurth, and read at the Geographical section of the British Association, some interesting facts were adduced as to the oases of the Libyan Desert. The inhabitants are described as more yellow in complexion than the Egyptians. Five ruins of temples built before the Christian era, seven strong Roman castles of the time of the early Emperors, and ruins of convents and chapels, were found, showing the state the civilisation of the oases had once been. Burnt brick was used in the buildings. Embalming was practised by the Christians of the first five centuries in the oases.

#### COMPETITIONS.

ST. STEPHEN'S CHURCH, TWICKENHAM.—The competition for the erection of St. Stephen's Church, Twickenham, appears to have been unsatisfactorily managed. The following letter appears in the *Richmond and Twickenham Times*, from an anonymous correspondent:—

"I am sorry to observe that there is every reason to fear that the competition for the above-named church has been conducted in a most unfair manner

towards the gentlemen who devoted their time in preparing elaborate sets of drawings for the proposed building. Not being one of the competing architects, though much interested in the proposed new church, which I had hoped would both be worthy of its object and the beautiful neighbourhood which it should adorn, I feel it incumbent on me to make a few remarks on the action of the committee. The eleventh clause of their instructions to competing architects was as follows:—'That in selecting the plans which may be adopted, the committee shall call in a consulting architect to advise with them.' This clause (if it means anything) must be construed to mean that the committee were to act in accordance with the consulting architect's judgment. Without this clause, I am in a position to assert that two at least of the four architects invited to compete would have declined to submit plans. Far from following the advice of the consulting architect, the committee have actually selected for execution the design which that architect placed fourth in merit. If the matured judgment of an eminent consulting architect was to be ignored, *cui bono* wasting the subscribers' money in paying the fee for such examination of drawings? And why was it held out as a lure to the competing architects that the committee would be guided in their judgment by such architect's report? So much for the integrity of the committee in selecting the worst design and ignoring the prior claims of the other competitors. Now to allude to a few of the defects, not to mention the architectural demerits of the selected design. It may be remarked that, in order to carry out this plan, the five beautiful elm trees which so greatly improve the site, and which it would be impossible to replace, must be sacrificed; and, referring to the description of the selected design contained in your issue of the 1st instant, it is stated that, 'The church will be capable, when finished, of accommodating a thousand persons on the ground floor, and an end gallery, if required, will hold three hundred more.' Now from actual examination of the selected plans, I find that the thousand persons on the ground floor will be most inconveniently crowded, and that there is not sufficient accommodation for such a number as regards entrances and passages. As to the remark that the end gallery will hold three hundred more, I should like to know how much of the ground floor space would be covered, and therefore inconvenienced, by such gallery, which, together with the staircases and passages thereto, must cover at least one-third of the whole area of the church! In conclusion I can only add that I have endeavoured to make a few impartial remarks for the benefit of the subscribers to the funds for the new church. But I am sorry to say that their committee have only succeeded in adding the name of Twickenham to the already (unfortunately) long list of unfairly decided competitions which I am afraid will not have the effect of increasing their funds or the number of their faithful friends."

#### DEMONSTRATION OF CEMENT LABOURERS.

—On Saturday the men employed in the cement works which line the Thames for three or four miles west of Gravesend made a demonstration in regard to certain proceedings now pending, in which Messrs. J. B. White and Brothers, of Galley-hill, have been indicted for causing a nuisance in the manufacture of cement. The complainant is Mr. S. C. Umfreville, of Ingress Abbey, situate about half a mile or more from Messrs. White's, at Galley-hill, and the complaint is that the smoke emitted from the cement-shafts is very disagreeable and injurious to health. On the other hand, it is asserted that the smoke and fumes, though they may be disagreeable, have no pernicious effect, and that the men employed in the works are singularly healthy. Within the last few days it had been stated that the complainants would not be satisfied with Messrs. White experimenting and doing their best to mitigate the alleged nuisance from the smoke, but that they were bent upon closing their works. Messrs. White's men, numbering about 800, thus finding their means of livelihood in great measure at stake, resolved upon holding a demonstration, in which the men of the other cement works readily joined. The cement workers and their wives, numbering between 4,000 and 5,000 persons, marched in procession to the ground, with bands playing and flags flying. A foreman, named Walkland, said the object of this movement was to shut up all the cement works in the county. He had been engaged in the works for sixteen years, and his father, who weighed twenty-four stone, had enjoyed good health for forty years. The Rev. T. H. Candy said he understood the object was to close the works, and that would be a great calamity to the parish. The death-rate had been steadily diminishing during the six years in which he had been connected with the place, while there had been a great increase in the population, which had doubled in little more than twenty years. Other speakers addressed the meeting, and resolutions declaring the proceedings in question unjustifiable were adopted.



## Building Intelligence.

### CHURCHES.

**BIRLEY.**—Birley Church, Herefordshire, was reopened on Thursday, the 20th inst., after rebuilding and restoration. The former edifice is of considerable antiquity, and consists of western tower, nave, south chapel, and chancel; no part being later than the thirteenth century, except the south chapel. The church, when stripped of its plaster coating inside, and its rough coating outside, was found to be in so dilapidated a state that it was absolutely necessary to take down the greater portion and rebuild it; but in doing so great care has, it is said, been taken in restoring it as far as practicable in its original entirety. The works have been carried out under the superintendence of Mr. Ward, architect, Stafford.

**DARTMOUTH.**—The Wesleyan Chapel in Market-square, Dartmouth, having been found inadequate for the accommodation of the congregation, it has been determined to rebuild and enlarge it, adding some 21ft. at the eastern end. Over the chapel, which will accommodate 600 persons, will be a schoolroom, 44ft. by 36ft. The façade of the building will be in the Classic style, and the interior will be modified to Italian, with seats and fittings of pitch-pine, varnished. The architect is Mr. John Wills, of Kingsbridge, and the builders Messrs. John and James Short, of Kingswear. The total cost will be about £1,800.

**GLASGOW.**—The Building Committee of the Parliamentary-road United Presbyterian Church have selected the plans prepared by Messrs. J. L. Bruce and D. Sturrock, architects, for a new church which it is proposed to erect at the junction of Bath-street and Holland-street. The church, which will be constructed to accommodate in area and gallery floors about 900 persons, besides having a hall on the basement floor capable of holding 412 persons, with usual retiring-rooms, will, it is estimated, cost £8,000.

**JEDBURGH ABBEY.**—For some time past the Marquis of Lothian has been devoting attention to the measures necessary for preserving the interesting ruins of Jedburgh Abbey. A most notable feature of the building is the doorway of the cloister on the south of the nave, a beautiful example of Transitional Norman work. This has been going so rapidly to decay that the Marquis has decided, instead of attempting restoration, to reproduce it in the form of an exact duplicate, to be put up probably as an entrance to the family mausoleum in the Abbey. The necessary drawings having been prepared by Mr. R. Anderson, architect, Edinburgh, the mason work was entrusted to Herbertson, Galashiels, and the carving to Farmer & Brindley, London. Another subject of special anxiety has been the state of the central tower of the Abbey. The Norman piers on the north side, originally of defective construction, have been so crushed by the superincumbent weight as to give rise to serious apprehensions for the stability of the structure.

**NORTHAMPTON.**—It is proposed to restore St. Giles's Church, Northampton, some portions of the edifice being in such a dilapidated condition as to be dangerous. The committee for effecting the work have consulted Mr. E. F. Law, architect, of Northampton, who recommends the complete restoration of the chancel and chapels, and other works, at a total cost of about £2,420.

**NORWICH.**—The memorial-stone of a new Unitarian Church was laid at King's Lynn on the 12th inst. The building is Gothic, of the Early Decorated period, and intended to accommodate 280 persons, and will cost about £1,000. Messrs. Adams and Son, of King's Lynn and Wisbeach, are the architects, and Mr. J. Leach is the builder.

**WAVERTREE.**—On the 20th instant a new Wesleyan chapel was opened at Wavertree. The site of the new building is on the northerly side of Victoria Park, and the style of architecture adopted is a free treatment of the Middle Pointed Gothic. The exterior of the building is built of coursed Yorkshire par-paints, with dressings of worked Red Woolton stone. Accommodation is provided for 600 persons. The whole of the works have been designed by and carried out from the plans with superintendence of Mr. John E. Reeve, architect, of Liverpool and Wavertree, Mr. Bosomworth acting as clerk of the works. Mr. David

Readdie was the general contractor, Mr. Johnson and Mr. Merrick doing respectively the slating and the plumbing, painting, and glazing; the gasfittings being by Mr. P. O'Connor, Wavertree, and the carving by Mr. Rogerson, of Liverpool.

**WEDNESBURY.**—The new church of St. Paul, Wood Green, Wednesbury, was consecrated on Friday last. The church, which is in the thirteenth century, or Early Geometrical, style, consists of a chancel, 32ft. by 19ft.; nave 60ft. by 22½ft. wide; with north and south aisles, 10ft. and 13ft. wide respectively, extending the entire length; an organ-chamber, on the south side of the choir, with heating-chamber under; a tower on the north side—at present only built up to the lower story of the belfry stage. The building will accommodate about 500 worshippers. Externally the walling is of red Hammerwick sandstone, with dressings of the same. Internally the piers, arches, and quoins are of Bath stone, the walls being plastered. The ground floor of the tower forms the choir vestry, and is separated from the north aisle and choir by an open traceried screen of oak and pitch pine. The nave, which is 36ft. high to the ceiling, is divided from the aisles by five moulded arches upon columns, with clerestory above, lighted on the north by mullioned and traceried windows, and on the south by cinquefoils. The chancel arch rises from moulded corbel shafts, the arch itself being of lofty and graceful proportions, and richly moulded. The western window consists of a mullioned two-light opening, surmounted with tracery, flanked on each side with simply-dressed lancets. The eastern window consists of five lights, surmounted with richly dressed and moulded geometrical tracery, forming an elegant design. A low septum or screen wall divides the choir from the nave; and the foot-pace of the altar is raised seven steps above the floor of the nave. The latter part of the nave is ceiled between the principals with matched boarding, divided into panels by moulded ribs, and sparingly decorated in neutral colours. The chancel roof is also panelled, the colouring here being brighter and richer, the three eastern bays being embellished with colour and gold. The designs were prepared by Mr. E. F. Clarke, London, and have been well carried out by Mr. Horsman, Wolverhampton. The cost of the building and fittings is about £5,300.—[We gave interior and exterior views of this church, April 5th, 1872.]

### BUILDINGS.

**BELFAST.**—A new collegiate school for ladies is about to be inaugurated. It is near the Queen's College. Its design, by Messrs. Young and Mackenzie, is in the Domestic style, with bay windows. It is of stone. There is a lecture-room, 67ft. by 30ft., and a fine dining-room. On the upper floor are the classrooms and separate music-rooms. The other floors contain the dormitories and separate rooms for elder pupils. The cost is upwards of £5,000, and the buildings are for Mrs. Byers' school. A gymnasium is situated in the rear.

**BELFAST.**—Last Tuesday week the foundation-stone of the Samaritan Hospital was laid by Dr. Hodges, of Queen's College. The building will be three stories high, faced with red brick, and with dressings of Dungannon freestone. The centre will have a pediment and will project. On the ground floor the accommodation is entrance-hall, waiting-rooms, consulting-room on either side, apothecary's-room, kitchen, and other offices. The first floor will contain a large and small dormitories, nurses' room, matron's room, lavatory, &c. On the second floor there will be two dormitories, nurses' and operating rooms (lighted from roof), and other conveniences. Captain Galton's ventilating stoves are used for the dormitories. Messrs. Dixon and Co. are the contractors, and Mr. W. Ha tings the architect. The building is to be erected at the expense of the late Edward Benn, Esq.

**GOSFORTH PARK ESTATE, NEAR NEWCASTLE.**—On Wednesday last operations were commenced towards extensive building operations on this estate. The working plans of the estate, which have been prepared by Mr. Thomas Parker, architect, Newcastle, show a provision of sites for every variety of house, from the moderate-sized plots for cottages to plots for villa residences of a few acres in extent, thus affording every facility to the business men of Newcastle to plant their dwellings "out in the clear," and that without the serious drawback of a long daily journey. The first

sod of the principal road was cut by Mr. Joseph Davidson.

**KING'S COLLEGE.**—The Governors of King's College are now engaged in enlarging the present building. A new triangular wing, one story high, built in a similar style of architecture and in a line with Somerset House, and fronting the Thames Embankment, is being rapidly pushed forward. This is built of Portland stone, and lighted by seven windows. In the rear the dissecting-room and laboratory are being considerably enlarged, and new consulting-rooms and offices erected. The completion of the works has been intrusted to Mr. T. Ennor, of Commercial-road, and is being carried out by Mr. Winsley, foreman of works.

**THE NEW LAW COURTS.**—The *Times*, in an article on what has been done and what is doing with the Law Courts, says:—Within those four wooden walls is now enacted day by day a scene which may well recall that simile of the beehive to which Virgil has likened the labours of the builders of Carthage. All seems at first sight disorder and confusion, where all, in reality, is order and the most methodical method. On the western side, from Carey-street down to the Strand frontage, stretches the vast workshop. Here are a dozen steam-saws at work every day and all day, together with three large revolving rubbing-tables for polishing the sawn stone, all worked from the large boiler-house which stands behind them. All along the line, piled one above the other—Ossa on Pelion—lie many hundred blocks of Portland stone, from 6 to 10 tons in weight, while overhead towers a huge crane—in technical language "the traveller"—which can lift the largest block as lightly as a lady may lift her lapdog. Here, too, are the stone-masons at work, of whom there are more at present engaged than of any other craft. Below all this, eastward and northward, lies stretched the ground-plan of the building. The whole area is floored with concrete to an average depth of 10ft., and on this goodly base the foundations are rising fast. They are, in fact, nearly completed throughout the west block, while in the northern portion of the east block the footings are even now ready for the stone plinths. Where the towers are to rise the concrete is laid still deeper, and this is especially the case in the south-eastern corner, where the ground was much broken, and the labour proportionately hard. Here the concrete has been put down in one spot to a depth of 17ft. below the level of the Strand pavement, and here are the excavations to which have been attributed the present condition of Temple Bar.

### SCHOOLS.

**WYVENHOE.**—This was one of the places where the school accommodation was found inadequate. The old school building, which accommodated 200 children, has been enlarged so as to hold 150 more. The work has been carried out, at an expense of £500, under the superintendence of Mr. F. E. Morris, architect, Mr. Chapman being the contractor.

**QUEEN ANNE'S STATUE IN ST. PAUL'S CHURCHYARD.**—The propriety of removing the statue of Queen Anne from St. Paul's Churchyard is being debated. Canon Liddon, in a letter to the *Times*, answers for the consent of the Dean and Chapter to the idea. He remarks that when the statue was erected it was lampooned by Sir S. Garth and other wits of the time; and, looking to its artistic merits, Dean Milman remarks that if it was executed by the statuary to whom Sir Christopher Wren intrusted the work, it proves either that "the art of sculpture was at a very low ebb in England, or that Sir Christopher for once had grievously misplaced his confidence" (*"Annals of St. Paul's,"* p. 438). London is parting reluctantly, although necessarily, with nobler relics of the past; and it may, perhaps, be a question for consideration whether the statue might not be repaired and re-erected in one of the many less conspicuous sites near St. Paul's that would readily suggest themselves.

**ROYAL BIRMINGHAM SOCIETY OF ARTISTS.**—The Autumn Exhibition of this Society opens this week, the private view having taken place on Wednesday. The collection of pictures is said to be of unusual variety and excellence, including as it does works by Messrs. W. P. Frith, R.A., Elmore, R.A., G. D. Leslie, R.A., Erskine Nicol, R.A., Bouguereau, Herbert, R.A., Houston, R.S.A., Selous, H. W. B. Davis, A.R.A., Henry Moore, Vicat Cole, A.R.A., Sir John Gilbert, A.R.A., Mille, Rosa Bonheur, and others.



## TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

TO OUR READERS.—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

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RECEIVED.—E. S. G.—L. and N.—H. G.—E. N. Y.—J. F. L.—J. R. D.—W. A. T.—J. H. L.

HARRY JAMES (The illustration will appear. Please send few lines of description).—W. R. W. (Very good).—J. P. EATON (Mr. Talbert's address is 5, Euston-square, London).—C. B. (Raphael Brandon is the architect of the Catholic Apostolic Church in Gordon-square).

## Correspondence.

## CISTERCIAN ARCHITECTURE.

(To the Editor of the BUILDING NEWS.)

SIR,—The western bay of the sacristy, divided from it by a partition wall (Tintern), or a room adjoining the chapter-house (Louth Park), was neither a penitential cell, nor a chamber of the dead. It opened directly upon the cloister, and formed the inner or private parlour, where official conversation was permitted to the monks when strict silence was observed in cloister. The cells or dungeons are well marked at Furness, and are in the rear of the eastern line of buildings.

The frater, fraterhouse, or refectory are common names for the dining-hall. The English designation of the calefactory was the common house, and, probably, it was used for certain manual arts; hence, in some cases, the apertures were unglazed.

The transept had invariably an aisle partitioned off into eastern chapels. At Beaulieu there was also a western aisle, I believe. Rievaulx had external chapels to the choir-aisle.

The presbytery was short and usually aisleless; the choir was under the crossing and projected into the nave, as at Valle Crucis. Balmerino had two parallel naves and choirs.

At Grey Abbey, Melrose, and Beaufort the cloister was on the north side, for the sake of water accommodation, as at Tintern.

Melrose had a central tower.

Where an arcaded alley or slype adjoins the chapter-house, the monks could assemble in it to form procession into chapter, or into the cemetery, hence the use of its double doorways.

The Parlour Extrinsic, or outer, was on the side of the guest-house, for communication with strangers.

There are two staircases, one for going up to the dormitory for the noon rest, and the second flight used for the night hours.

An excellent example of the hatch or turn is in the east wall of the kitchen of Tintern.

At Beaulieu the distinction between the guest-house and lay brothers' chamber is well marked, although both form one range. Of course, in a large monastery the guest house was detached. At Fountains the difference of the windows in the western range of claustral buildings defines allotment to two classes of occupants.

We should remember that there were great changes in the arrangement or application of buildings, and eminently at Ford, as the rule was relaxed, and that England modified the original ground-plan. Brillat Savarin says the most sumptuous dinner was served in the Cistercian house at Paris.—I am, Sir, &c.,

MACKENZIE E. C. WALCOTT.

## PROPOSED TOWN-HALL, HASTINGS.

SIR,—I see inserted again in your issue of August 14 an advertisement, under "Competitions open," asking for designs for the above-named building. On July 31st I wrote to the town-clerk of Hastings in the name of a well-known architect, requesting plans of site and particulars with a view to preparing plans for the same. Three days afterwards an answer is received stating that all the necessary particulars had been given away. Now it does certainly seem strange to find, two weeks after that date, the same advertisement open, when, according to the statement of the town clerk, all the particulars requisite for competition had been parted with before the beginning of the present month. It might save waste of time to other architects if they were aware that this is the case, and such must be my excuse for troubling you.—I am, Sir, &c., T. H.

## Intercommunication.

## QUESTIONS.

[3431].—Bath Stone.—Can a correspondent inform me the best preservative of Bath stone in sea air situations? Is Ransome's solution effective?—H.

[3432].—Steel.—Can any one of your readers give me an example of the application of steel to roofs?—G.

[3433].—Foundation.—I shall be obliged if a correspondent can give me the average weight per foot superficial on foundation of brick buildings?—ARCHITECT.

[3434].—Smoky Chimneys.—Can you or any of your readers tell me the best and simplest means of curing smoky chimneys in the case of a low house attached to a lofty warehouse that rises to twice its height? The chimneys are not quite close to the warehouse.—INQUIRER.

[3435].—Strength of Tee Iron.—I should be glad if some reader would give a formula for calculating the strength of T iron when the "table" is placed uppermost?—G. P.

[3436].—Retaining Walls.—Will some correspondent kindly state what factor of safety is used for the above, i.e., what should be the excess of strength of a wall over the overturning thrust which it resists?—G. P.

[3437].—Limit of Railway Curves.—I shall be glad to know the formula for determining the least radius for a railway curve, apart from all consideration of speed, &c. For example, suppose a railway carriage has a wheel base of 20ft. in length, and the gauge of the railway is 5ft., what is the sharpest curve that the carriages will take without leaving the rails, taking the play between the wheels and the rails at, say one inch?—G. P.

[3438].—Lattice Girders.—Will some correspondent kindly give a formula for calculating the strains on girders of lattice girders, applicable generally?—G. P.

[3439].—Chimney Shaft.—Will any of your correspondents kindly say what height and size a chimney shaft should be to make two horizontal flues 142ft. long, 2ft. by 2ft. wide, work efficiently? Also a similar length of flue, 18in. by 18in. wide?—ENQUIRER.

[3440].—Specific Gravities and Strength of Stones.—Can any of your numerous practical or scientific readers give me authenticated results of the following?—1. Specific gravities of Portland, Bath, and other Oolites; 2. Their crushing strength or weight per square inch. I have consulted various tables, and the differences are so great that little reliance can be placed upon them. I should also like to know the absorption of each in terms of the bulk.—G. H.

[3441].—Timber.—I want to know the crushing weights per square inch for Memel, red pine, and other fir timber, and the weight per cubic foot. Average results are required.—G.

## REPLIES.

[3391].—Adjusting Dumpy Level.—I presume "Colonist" wishes to know principally how to adjust

the line of collimation. Set up the level exactly midway between two points, level the instrument, and note the readings at the two points, the difference between which will give the exact difference of level, although the collimation may be out of adjustment, as the error on both sides is equal, and therefore neutralises itself. Then remove the level, and set it up outside one of the two points, so that you can read off both points again without moving the telescope. If the line of collimation is right, the difference in the readings will coincide with the difference obtained by the first operation; if it does not agree, then (first seeing carefully that the instrument is properly levelled) raise or depress the cross hairs until the readings give the same difference of level as obtained by the first operation.—G. P.

[3413].—Mr. Burges's Model of St. Paul's.—I must say I was somewhat amused when I saw this question three weeks since in "Intercommunication," and I have waited to see whether there would be an answer. "A Country Architect" must be the veritable "young man from the country," or he would not have asked such a question. It is not likely that Mr. Burges's model will ever see the light again, and sorry enough must Mr. Burges be that it ever saw the light at all. It was showing the model which produced the exasperation in the public mind, and brought down such a proper condemnation. Mr. Burges's description, which was written to explain the model, would have opened but few men's eyes. No doubt the description will be "out of print" for ever, and the model will be no more seen, and the author of both will be glad enough to hear the last of them. Since the first murmurings of hostile criticism broke on Mr. Burges's ear, he has taken refuge in silence. He has said nothing in his defence, and it is not likely that he would again exhibit the model which has caused him so much anxiety.—A LONDON ARCHITECT.

[3422].—Truss Girders.—In answer to "J. S." I would say that the vertical bars in the lattice girder he describes are not used as direct mediums for carrying the weights at the apices to the abutments, as this is done by the lattice bars, which, if strong enough, are quite sufficient without the verticals. The vertical bars, however, serve to equalise between the top and bottom flanges any vibrations or extra strains that may come on either of them.—R. JNO. G. R.

[3416].—Breaking Weight of Timber.—The breaking weight of a timber beam of  
length =  $l$   
breadth =  $b$   
depth =  $d$  all in inches.

Coefficients of tenacity and crushing being about equal to each other, = C. Then the breaking load distributed over the beam =

$$W = \frac{4.5 d^2 C}{3 l}$$

For a joist 12ft.  $\times$  9in.  $\times$  4in., taking C at 12,000lbs. = 5'35 tons

$$W = \frac{4 \times 4 \times 81 \times 5.35 \text{ tons}}{3 \times 144} = 16'05 \text{ tons} =$$

about 1½ tons per foot run.—R. JNO. G. R.

[3421].—Strength of Railway Bridges.—The live load for railway or road bridges will, of course, depend on the weight of the vehicles running over them, and also on the distribution of that weight on the axles. For a single line of way in this country it is usual to reckon one ton per foot run in addition to the weight of the bridge. For road bridges the moving load may be taken at about 80lb. per square foot of roadway, but the cross girders should be strong enough to sustain a concentrated weight of five or six tons on any point.—R. JNO. G. R.

[3421].—Loads on Girder Bridges.—Heppel gives the following formula—Let D = greatest distributed load per foot run, C = greatest load on axle; S = span of girder, L = equivalent load on centre—then L = the greatest load, if it be greater than, or equal to the distributed load on girder, and

$$L = \frac{C + DS}{2} \text{ if C is less than greatest distributed load. —G. H.}$$

[3426].—Brown Stone.—There can be no doubt but Ham-stone is the best to alternate with Bath stone in arches. CHARLES TRASK, Norton-sub-Hamdon, near Ilminster.

[3427].—Damp-proof Course.—The best damp-proof course is asphalt. Taylor's vitrified and perforated damp-proof course, if carefully bedded in cement, will be equally effectual, or simple layers of slate in cement.—G. H. G.

[3430].—Removing Old Paint.—"J. S." will find potash and hot water a good thing for cleaning the doors in question. It must be applied with a scrubbing brush and plenty of "elbow grease." And although this may involve a good deal of labour (unskilled, for a labourer may readily do it), the potash will bring away all the paint without damaging the oak tracery, although it will, of course, raise the grain a little. I may give as an instance that some sixteen years ago I got all paint, &c., off the whole of the fine ancient oakwork in the chancel of Ecclesfield church, Yorkshire, by these means. Afterwards the wood had a coating of linseed oil given it; and, on a recent visit, I was gratified to find it looking exceedingly well.—HARRY HEMS, Exeter.

[3430].—Removing Old Paint.—In answer to this query Messrs. Walter Carson and Sons send us a



circular which describes the qualities of "Lethicum" which they supply, and which will effectually remove old paint in twenty minutes.

#### STAINED GLASS.

**NORHAM.**—A stained-glass window has been erected in the parish-church of Norham, in memory of the late Lord Marjoribanks, of Ladykirk. The subjects are: "The Angel appearing to Cornelius," and the "Parable of the Good Samaritan." A tabernacled canopy surmounts each picture. The work was designed and erected by Mr. Baguley, of Pilgrim-street, Newcastle.

#### STATUES, MEMORIALS, &c.

**ST. THOMAS'S HOSPITAL.**—On Monday afternoon Mr. Noble's statue of the Queen for the hall of St. Thomas's Hospital, was conveyed from his studio to the hospital. Her Majesty is represented seated in a chair of state, with one foot resting upon an embroidered cushion. The statue, which is of white marble, will be placed temporarily just within the main entrance to the hospital, and is expected to be uncovered in the course of ten days or a fortnight.

#### WATERSUPPLY AND SANITARY MATTERS.

**ABINGDON.**—Mr. Mellis, C.E., who had been invited to give his opinion on the question of the drainage of the town, states, in his report submitted to the meeting of the Council on the 12th instant, that the sanitary requirements of the town may be divided under three heads, viz.:—A good water supply, sewerage of the town, and disposal of the sewage. It was the latter to which his immediate attention had been specially given, but, as the three items were so intimately connected with each other, it was necessary to touch also upon the other two, and he advised that all the several works be carried out simultaneously.

**BARNSELY AND THE BIRMINGHAM SEWAGE SCHEME.**—Mr. Hawksley has been consulted as to the utilisation of the Barnsley sewage, which the Corporation, under a recent decision of the Court, is compelled to carry out. Mr. Hawksley has reported, recommending a scheme similar to that in use at Birmingham. A meeting with General Scott has been arranged by the corporation. Some of the members have also inspected the experiments with sewage made by Messrs. Bailey and Hallsworth, of Leeds. Two or three drops of the deodorising liquid dropped into a quantity of sewage taken from the town sewage outlet, made it curdle and work, the sediment falling to the bottom, leaving the water perfectly clear and odourless. The cost of the deodoriser is 1d. per gallon.

**BRIGHTON.**—Dr. Kebbell, Medical Officer of Health of Hove, writes to say that the imperfect and dangerous system of draining the sewage of Brighton into the sea front has been at length rectified. An intercepting sewer has been constructed, at a cost of nearly £100,000, by means of which the whole of the town sewage is taken out and discharged at a point three miles and a half beyond Kemp Town. This is salutary progress with a vengeance. Why, it is as bad as Brighton, as we have said before, being honeycombed with cess-pools! The Brighton authorities have simply made "a blunder," from which they cannot escape any more than they can from their own shadow.

**DUBLIN.**—The river Liffey is anything but sweet, it appears, in certain states of the atmosphere and tide. Mr. O'Hara, C.E., proposes to make the canals which encircle Dublin act as a flushing power, and we think the idea a good and easily applied one. He proposes to lay short lines of pipes at various points from the canals to different points of the main sewers, the valves at the canal end being opened about 3 hours before low water, so that the sewers and drains will be thoroughly flushed. He also proposes to diminish the admission of solid matter into the river by compelling manufacturers to pass their waste liquids through wire strainers fitted in the drains; to supply distilleries, &c., with a sufficient stream of cold water to lower the temperature of the warm liquids when discharged, so as to prevent the liberation of noxious gases.

**NEW SOURCE OF WATER SUPPLY.**—Mr. J. Lucas, of the Geological Survey of England, has just published a treatise "On Horizontal Wells," in which he asserts that he gives a "solution of the problem of supplying London with pure water." Examining the geology of the Greensands and Chalk of Surrey, he finds that above 1,000ft. of porous strata rests upon a bed of "absolutely impervious clay," and he contends that "a tunnel driven along the strike of the beds, or water level, must of necessity arrest all the water that is flowing down it as far as the gallery is carried."

**NUNEATON.**—A special meeting of the Nuneaton Local Board of Health was held on Wednesday week, for the purpose of considering a letter received from the Local Government Board, enclosing a copy of a communication which had been addressed to them by Captain Townshend, of Caldecote Hall, complaining of the pollution of the river Anker by the improper discharge of sewerage matter into the river Anker from the works at Nuneaton, and requesting that the Local Government Board would direct such steps to be taken

as might appear to them to be most desirable to compel the Local Board of Health to take immediate steps to remedy the evil. The Clerk was instructed to communicate with the General Sewage and Manure Company, who have the works on a lease.

**RICHMOND.**—With a view to secure a better supply of water in the Thames in the neighbourhood of Richmond, the local authorities of that and adjacent places propose that a lock should be constructed below Richmond Bridge. A conference on the subject was held at Richmond on Saturday, at which it was agreed that this plan is preferable to the proposal to dredge the river, and resolutions in favour of it were adopted.

**THE CONTINUOUS WATER SUPPLY FOR WHITECHAPEL.**—Dr. John Liddle, Medical Officer of Health for the Whitechapel District, has just issued his Report on the sanitary condition of the locality under his charge. He states, among other matters, that water supply on the constant service system is now general in the northern parts of the district, which is within the water limits of the East London Company. From inquiries which the Sanitary Inspectors have made of the inhabitants, it appears that the change from the intermittent to the constant-service system has given satisfaction, and no inconvenience has been experienced by the inhabitants while the alterations in the fittings were in progress, and the expense has not been complained of either to the Local Board or to its officers. The cost to the owners in making the alterations ranges from 7s. 6d. upwards, the amount depending on the length of new pipe required. In some cases there has been no occasion to disturb the old fittings. The cost of alterations has not been nearly so great as was anticipated, and the companies are desirous to lessen as much as possible the expense to owners of property. The screw-down taps are in general use, and they appear to be best for private dwellings. The Kilmarnock machine, Kennedy's and Guest and Chime's patents, are best adapted for courts; but no doubt further improvements in the course of a short time will be made in the several apparatus in use. Every house in the district where a constant supply is given will be provided with a stopcock, situated in the street, so that in the event of the fittings getting out of repair, the occupiers can turn off the water pending the repairs. Dr. Liddle states that at the end of the year 1875 the whole of the Whitechapel district will probably be supplied on this system, and that all the butts and cisterns which are now in use in the poor localities will be abolished, and that the inhabitants will be able to obtain a glass of cool pure water direct from the main. In all the reports which have been made upon the subject of water supply to the Metropolis it is recommended that the constant service should be adopted; but in adopting this system of water supply it is necessary, for the protection of the public health, to lay down such rules as regards the fittings as will prevent any contamination of the water; for unless due care is taken by all householders receiving water on the constant system, not only will there be danger to the health of the inmates of any particular house, but the danger may extend to all those householders who are supplied by the same service pipe.

**SOUTHPORT.**—The Southport Corporation have decided to adopt the Crossens scheme of sewerage, as recommended by Mr. Mansergh, C.E., of London. It will entail a cost of £50,000.

#### LAND AND BUILDING SOCIETIES.

**TUNBRIDGE WELLS.**—The annual meeting of the Tunbridge Wells, Tunbridge, and Weald of Kent and Sussex Permanent Mutual Benefit Building Society, was held on Wednesday week. From the annual report, it appeared that eighty new shares had been issued during the past year. The profit and loss account stated the liabilities at £17,998. 19s. 2d., including £4,153. 4s. 8d. in reserve to meet future redemptions and contingencies. The assets, after making all allowances, showed a balance at the banker's of £375. 4s. 10d.

#### LEGAL INTELLIGENCE.

**A DISPUTED TRANSACTION IN TIMBER.**—**IRVIN AND ANOTHER v. WATSON AND ANOTHER.**—This was an action tried at the Liverpool assizes on the 19th inst., before Mr. Justice Archibald and a common jury. The plaintiffs, Messrs. Irvin and Son, timber dealers, of Preston, sued the defendants, who are railway contractors, of Antrim, in reference to a quantity of timber which plaintiffs purchased from the defendants. It appeared that in the latter part of last year the defendants had a large quantity of timber to dispose of at Antrim. One of the plaintiffs, having inspected it, agreed to purchase a portion, which was accordingly sent to the defendants. In the course of the transaction, the plaintiffs paid money to the defendants, and the former alleged that, when the entire amount between them was made up, they had overpaid the defendants £46, for which they now sued. After the case had been part heard, it was agreed between the parties that a verdict be entered for the plaintiffs for £23. 7s. 6d., with leave to them to move to increase the amount.

**RIGHT TO REPAIR FENCE.**—In a case, *Lee v. Hignett*, the judge's remarks were of some value. 1st. When a fence belongs to the injurer, he is liable if fence is bad. And he is also liable if it were good, on the

principle that when one or two innocent persons must suffer, he who occasioned the loss must be the sufferer. 2nd. If the fence belongs to party injured, and it is good, he is entitled to damage; but if it is bad, he is not. In some cases there is a kind of easement by which a person is bound by prescription to keep up his fence, not only to prevent his own animals straying, but also to keep out his neighbour's, not for his own, but his neighbour's protection. The remedy is against the occupier as distinguished from the owner, and the occupier may be sued for the loss or injury to cattle though the defect in the fence was occasioned by the act of a third party.

**WHAT IS A BUILDING?**—At the Southport police-court on Friday last a case came before the magistrates in which the question What constitutes a building, according to the interpretation of the Act of Parliament? was raised, and discussed with much animation. Mr. Crabtree, borough surveyor, acting under instructions of the highway committee, summoned Mr. Mark Cooper and Mr. William Coulthard, both formerly residing in Manchester, for committing a breach of the Southport Improvement Act by neglecting to cover a piggy and hen-cote on their premises with slate instead of timber, which the bylaws specified as a combustible material. Mr. Barker, who appeared for the defendants, contended that it was a farce to call a piggy a building. Mr. Walton, who appeared for the corporation, argued that as the piggy had sides and roof it came within the meaning of the Act of Parliament, and that even a dog-kennel, if it had a roof, was a building. The magistrates told the defendants that they had broken the law, but as they had done so in ignorance of the bylaws, they would therefore let them off on payment of costs.

#### Our Office Table.

**THE TOMB OF LEONARDO DA VINCI.**—The Paris Correspondent of the *Times* says: "The repairs ordered by the Comte de Paris at the Château of Amboise have brought to light the tomb of Leonardo da Vinci, who was known to have died in the neighbourhood, but whose burial place was unknown. A stone coffin bearing his name was discovered under a thick bed of earth, and on its being opened the painter's remains were found in a perfect state of preservation. They will be deposited in the chapel of the Château."

**CREMATION.**—The *Lancet* says "the manner in which Sir Henry Thompson's famous proposal has been taken up in all civilised countries leaves little room to doubt that cremation, as a means of disposing of the dead, will soon supersede inhumation. The German Cremation Society in New York, numbering about 450 members, have decided on erecting a suitable hall, with walls of iron, 60ft. by 44ft., containing a rotunda supported by eight pillars. In the centre there will be erected an altar for religious ceremony, and upon a large stand in front of this will be placed the coffin. The ceremonies ended, the coffin would be gradually lowered by means of screws into a furnace, where it would be submitted to a hot air blast of 1,000 degrees Fahrenheit. It is calculated that complete cremation would take place in a hour and a half, after which the coffin would be again returned to the altar. The ashes would then be gathered and placed in urns provided by the relatives of the deceased. Connected with the furnace there will be an apparatus for condensing the gases and smoke." We nevertheless are distinctly of opinion that cremation will not be adopted by civilised communities, and all the talk about it will end in something far more unsubstantial than smoke. Sir Henry Thompson and others, who are attempting to revitalise a Pagan custom, are simply calculating without their host. Mortal humanity having slowly and gradually come from the earth, will in all probability during the coming ages, as during many past ages, be committed to the grave, to slowly and gradually return to the earth again. The cremation process is by far too violent to recommend itself to the emotional nature of ordinary men, however it may reconcile itself to the minds of a few everyday philosophers.

**INCOMBUSTIBILITY OF WOOD PAVING AS LAID IN LONDON.**—Wood paving appears, says the *Gardener's Magazine*, to win the day in the contest for a footing in London city. As it is laid, there can be no possible risk of the pavement contributing to the spread of fire, and it is next to impossible it should ever originate a conflagration by its own combustibility. It is well saturated with tar, certainly, but it is so laid that there is no air space beneath it, and it would therefore be difficult to set it on fire, even if its destruction by







	Per 120 12ft. 2½ × 6½. £ s.	£ s.
Dram, 2nd yellow	2½ by 6½	11 0
" 3rd white	2 by 6	9 10
Christiana, 3rd white	2½ by 6½	10 0
Porsground, 2nd yellow	2½ by 6½	11 15
" 3rd "	2½ by 6½	11 10
" 2nd "	2½ by 7	11 10
" 3rd "	2 by 6½	11 5
" 3rd "	2½ by 6½	10 15
Per 120 12ft. 3 × 9.		
Quebec, 1st spruce	3in.	19 15
" 2nd "	2in.	18 0
" 3rd "	3in.	17 10
St. John's unsorted do.	3 by 11	17 10
Gaspe "	"	16 5
Per cubic fathom.		
Petersburg lathwood	"	10 0
Riga, &c., "	"	8 0
Per 18 feet cube.		
English and Dutch Riga crown logs	"	6 10
Brack Riga logs	"	4 15
Memel crown logs	"	4 15
" brack "	"	3 15
Per ton.		
Bahama satinwood	"	7 5
Rio rosewood	"	14 0
Bahia "	"	12 0
Ceylon ebony	"	12 0
African billet do.	"	12 0
Lignum vitæ	"	6 0
Cuba cocus wood	"	5 0
Turkey boxwood	"	5 0
Per superficial foot.		
St. Domingo mahogany	"	8 7
" curls	"	1 0
Cuba " cargo av.	"	0 7
Honduras "	"	0 4
Mexican "	"	0 4
Tabasco "	"	0 5
Italian walnut	"	4½
Black Sea "	"	3½
Canadian "	"	3
Per mille of pipe.		
Crown Memel staves	"	250 0
Brack "	"	220 0
Canadian standard pipe	"	80 0
United States pipe	"	50 0

### WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay.—For samples and further particulars, apply to the MANAGER, at the Quarries Narberth-road, R.S.O.—[ADVT.]

### TENDERS.

CLACTON-ON-SEA.—For St. Paul's new district church, to be built of concrete, Mr. G. Gard-Pye, architect.		
Clarke and Son	£995	0 0
Luff	972	0 0
Dobson	955	0 0
Snelling	924	0 0
Saunders and Son (accepted)	883	0 0
Concrete and Plasterer's Work Only.		
Drake and Co.	569	0 0

ESSEX.—For rebuilding Hainault House, at Chigwell, exclusive of paper-hanging, plumbing fittings, stoves, gas-fittings, and bell-hangings, for Mr. Thomas Blundell, Messrs. Arthur and C. Harston, architects, Quantities supplied.

Perry and Sons	£2,941	0 0
Ennor	2,897	0 0
Bangs	2,875	0 0
Pain	2,765	0 0
Palmer (accepted)	2,450	0 0

FINSBURY PARK.—For Wesleyan Methodist chapel and schools, Mr. F. Boreham, architect.

Waldram and Co.	£7,310	0 0
Scrivenor and White	7,250	0 0
Chessum	7,195	0 0
Dove Bros.	6,785	0 0
Roberts	6,773	0 0
Bayes and Ramage	6,700	0 0
Hill, Higgs, and Hill	6,640	0 0
Ennor	6,591	0 0
Richards	6,390	0 0
Blackmore & Morley	5,655	0 0
Parsons	5,599	0 0
Pavitt (accepted)	5,473	0 0

HAMMERSMITH.—For Wesleyan Chapel, Mr. Charles Bell, architect.

Ennor	£8,250	0 0
Dove Bros.	7,995	0 0
Cowland	7,987	0 0
Niblett and Son	7,946	0 0
Hobson	7,754	0 0
Elkington	7,664	0 0
Nye	7,640	0 0
Downs	7,293	0 0
Manley and Rogers	7,267	0 0
Stimpson	7,270	0 0
Gibson	7,000	0 0
Brown and Robinson	6,935	0 0
Newman and Mann	6,987	0 0
Nightingale	7,970	0 0
Adamson and Son	6,885	0 0

LONDON.—For studio, Fitzroy-road, Regent's Park, for Mr. E. A. Goodall, Messrs. Batterbury and Huxley, architects.

Manley and Rogers (accepted) £250 0 0

LONDON.—For rebuilding 412, Kingsland-road. Mr. E. H. Horne, architect. Quantities supplied.

Marks	£844	0 0
Hayworth	795	0 0
Lewis	790	0 0
Waldram and Co.	786	0 0

MARKET HARBOUROUGH.—For new vicarage house. Mr. George Vials, architect. Quantities by Mr. L. C. Riddett.

Harrold	£2,355	0 0
Fletcher	2,168	0 0
Henson, J. and G.	2,100	0 0
Bassett	2,097	0 0
Peach	2,050	0 0
Norham	2,016	0 0
Conquest	1,998	0 0
Jennings	1,995	0 0
Henson W.	1,993	0 0

PADDINGTON.—For a vicarage at St. Peter's, for the Rev. W. H. O'Brien Hodge, Messrs. Vigers and Philpots, architects. Quantities by Mr. Sydney Rogers.

Corder	£2,771	0 0
Thompson and Smith	2,724	0 0
Temple and Forster	2,673	0 0
Dove Bros.	2,645	0 0
Bayes and Ramage	2,450	0 0
Mark	2,430	0 0
Architect's estimate	2,559	0 0

PORTMAN-SQUARE.—For works, 9, Seymour-street. Mr. J. H. Stevens, architect.

Elkington	£1,390	0 0
Merritt and Ashby	1,259	0 0
Nightingale	1,233	0 0
Wagner	1,150	0 0

WESTBOURNE GROVE.—For alterations, &c., to Nos. 11 and 16, Westbourne-grove, for Messrs. Seward Bros. Mr. W. S. R. Payne, architect.

Blott	£695	0 0
Bowles	661	0 0
Smith	640	5 0

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### COMPETITIONS OPEN.

ARLESSEY, BEDFORDSHIRE, Sept. 30.—For plans for Board schools and master's residence. T. J. Hooper, Clerk to the School Board, County Court Office, Biggleswade.

CARDIFF, Sept. 29.—For designs for the proposed Free Library, Museum, and Science and Art Schools. Mr. E. Payne, Hon. Sec., The Wharf, Cardiff.

HASTINGS, Sept. 24.—For designs for a new Town Hall, with police offices, lock-ups, public offices, &c. Premiums of £100, £50, and £25 will be given for the three most approved designs. Mr. G. Meadows, Town Clerk, 8, Bank-buildings, Hastings.

WONFORD HOUSE HOSPITAL FOR THE INSANE, NEAR EXETER, Aug. 31.—For designs and estimates for a chapel and kitchen. A Premium of £40 will be given for the most approved design. Dr. Lyle, Wonford House Hospital, Exeter.

Geometrical and Encaustic Tile Pavements in every variety. Over Sixty New Designs at 5s. 6d. per yard, super. "The Tiles are excellent, both in quality and colour."—BUILDING NEWS. "They are of great excellence in design—the material is not surpassed by any found in this kingdom."—Art Journal. "The patterns are remarkably good and effective."—Gresham's Magazine, &c., &c. Designs and sample Tiles free on application to HENRY C. WEBB, Tiles, Worcester. London House, 114, Victoria-street, Westminster. Mr. T. Pulling, Agent.—[ADVT.]

### CONTRACTS OPEN FOR BUILDING ESTIMATES.

ALCFSTER RAILWAY, Sept. 18.—For the supply of iron rails, fish-plates, tang-bolts, fish-bolts, and nuts, and creosoted Baltic red wood sleepers. Mr. W. Clarke, C.E., 45, Parliament-street, Westminster, S.W.

BARNSELY, Sept. 5.—For the erection of a foundry, shops, and offices, near Summer-lane Station. Mr. W. Hinde, Regent-street, Barnsley.

BATTERSEA, Sept. 1.—For making up Seldon-street, Sheldrake-street, and Cologne-road. Mr. A. A. Corsellis, Clerk to the Wandsworth District Board, Battersea-Road.

BIGGLESWADE SCHOOL BOARD, Sept. 14.—For the erection of boys', girls', and infants' schools. T. J. Hooper, Clerk to the Board, Biggleswade, Beds.

BLAIND, Sept. 7.—For the erection of a police station. Mr. W. P. James, architect, Cardiff.

BOGNOR LOCAL BOARD, Sept. 2.—For supplying and laying about 700 yards of 18in. cast-iron socket pipes. Mr. T. Janman, Clerk to the Board, Bognor, Sussex.

BOLTON, Sept. 22.—For the erection of a high level roadway between Deansgate and St. George's-road. Mr. B. Proctor, Town Hall, Bolton.

BROXBOROUGH, Aug. 31.—For the execution of sewerage works. Mr. T. W. Grindle, C.E., 205, Gresham House, Old road-street, E.C.

DUNFERMLINE, Aug. 31.—For the formation of a street. Mr. Andrew Scobie, architect, Cummore-street, Dunfermline.

EALING LOCAL BOARD, Sept. 4.—For the supply of 1,000 tons of broken blue Guernsey granite. C. Jones, Surveyor to the Board, Ealing, W.

HEADINGLEY, LEEDS, Aug. 31.—For the erection of 16 dwelling-houses and outbuildings, near Shaw-lane. Messrs. Hill and Swann, architects, Leeds.

HIGH WYCOMBE, Sept. 10.—For supplying engines and pumps, engine and boiler-house, reservoir and mains. Mr. J. W. Wilson, Engineer, South Tower, Crystal Palace.

HORFIELD, Sept. 8.—For the erection of a boundary wall on the site of the new prison. Messrs. Brice and Burgess, City Solicitors, Council House, Bristol.

HORNSEA LOCAL BOARD, Aug. 31.—For the construction of brick and pipe sewers, settling pits, pilling and other works. C. F. Butler, Engineer to the Local Board, 10, Bowalley-lane, Hull.

HOVE, SUSSEX, Sept. 10.—For providing and laying about 500 yards of asphalt paving. C. A. Woolley, District Clerk, Town Hall, Hove.

KNARESBOROUGH CEMETERY, Sept. 3.—For the erection of chapels, lodge, &c. Messrs. Robinson and Marshall, architect's, Tyrrell-street, Bradford.

LYONS-DOWNS, NEW BARNET, Sept. 7.—For the erection of master's house, boundary wall, &c., at the schools. Mr. G. B. Williams, architect, Frederick's-place, Old Jewry, E.C.

LEEDS, Aug. 31.—For the erection of proposed chapel at Hyde Park. Mr. C. O. Ellison, architect, Imperial Chambers, Dale-street, Liverpool.

LEEDS, Aug. 31.—For the erection of 3 houses, and shops and brewhouse in Roundhay-road. Messrs. Wilson and Bailey, architects, Central Market-buildings, Leeds.

MAIDA VALE, Aug. 31.—For taking down and rebuilding No. 40, Maida Vale. H. M. Burton, Surveyor, 14, Spring-gardens, S.W.

MELMERLEY, Aug. 31.—Contract No. 1. For 456 yards 12in. sanitary pipes, and 473 yards of 8in. ditto, with all the necessary bends, junctions, &c. Contract No. 2. The building of subsiding tank and excavating for and laying about 900 yards of 12in. and 8in. sanitary pipes. Mr. W. E. M. Wain, Board-room, Kipon.

METROPOLITAN BOARD OF WORKS, Sept. 24.—For the formation of carriage and footways in Wilderness-road, E.C. Sir J. W. Bazalgette, C.B., Engineer to the Board Spring-gardens, S.W.

MIDLAND RAILWAY, Sept. 1.—For the supply and erection of ironwork for widening bridges. Engineer's Office, Midland Railway, Derby.

MIDLAND RAILWAY, Sept. 1.—For the erection of additional fitting shops, smithy, and other buildings, for the locomotive and carriage department at Derby. Engineer's Office, Midland Railway, Derby.

NORMANTON LOCAL BOARD, Aug. 31.—For the excavating, pulling, brickwork, &c., required in constructing a reservoir at Marshall Hill. Mr. E. Lynam, C.E., Bask-street, Westgate, Wakefield.

ORLEY, Aug. 31.—For the erection of a court-room and offices adjoining the lock-up. Mr. B. Hartley, Surveyor, Pontefract.

ORLEY, Sept. 5.—For additions to the paper-mills. Mr. W. Bakewell, architect, 12, East Parade, Leeds.

PHOSPHATE SEWAGE CO., Sept. 1.—For alterations and additions to the present sewage works at Hertford. Mr. T. W. Grindall, C.E., 205, Gresham House, Old Broad-street, E.C.

RAMS-GATE, Aug. 31.—For the erection of a new infant school in St. George's-road; and for additions and alterations to Christ Church Schools, Royal-road. Mr. Hodgson, High-street, Margate.

ROTHERHITHE, Sept. 1.—For making the carriageways and kerbing and paving the footways of Nellidale and Pellworth-roads. Mr. Thomas, surveyor, 90, Paradise-street, Rotherhithe.

SHEFFIELD, Aug. 31.—For laying out Weston Park. Mr. P. B. Coghlan, Boro Surveyor's Office, Bower Spring, Sheffield.

SHIPLEY, Aug. 31.—For providing new oak seats and altering the galleries of St. Paul's Church. Messrs. T. H. and F. Healey, architects, Tyrrel-street, Bradford.

ST. PANCRAS, Sept. 3.—For painting the outside wood and iron work at the schools, Leavesden Woodside, near Watford. D. Fildew, Clerk to the Guardians, Vestry Hall, Pancras-road, N.W.

ST. PANCRAS, Sept. 14.—For painting and keeping in repair about 236 lam. columns, head irons, and lanterns. T. E. Gibb, Vestry Hall, Pancras-road, N.W.

SWINERLEET, Sept. 2.—For the erection of a mixed boys', girls', and infants' school, with master's residence and out-offices. Messrs. Smith and Brodick, architects, Cogan's-chambers, Hull.

TADCASTER CEMETERY, Sept. 10.—For erecting chapels, lodge, boundary walls, and laying out grounds. Messrs. Atkinson, architects, 12, Micklegate, York.

TRINITY HOUSE, Aug. 31.—For alterations, additions, and repairs to the Naze tower, near Walton-on-the-Naze; Trinity Buoy Store, Harwich.

WALTON-ON-THE-HILL, Sept. 14.—For the execution of sewage works. Messrs. Goodson, Atkinson, and Forde, Civil Engineers, Orange-court, Castle-street, Liverpool.

WANTAGE TRAMWAY CO., Sept. 15.—For constructing about 2½ miles of single line tramway. Mr. G. Stevenson, Wantage.

WAREHAM, Sept. 7.—For the erection of new wards at the Wareham and Purbeck Union Workhouse. Mr. F. J. Piller, Wareham.

WOLVERHAMPTON, Aug. 31.—For painting the exterior, and for painting and decorating the interior of the Town Hall. Borough Surveyor's Office, Town Hall, Wolverhampton.

### LATEST PRICES OF MATERIALS USED IN CONSTRUCTION.

(From the Public Ledger.)

	LEAD.			
Pig Foreign	per ton	£20 0 0	£20 15 0	
" English W.B.	"	22 15 0	23 0 0	
" Lead Co.	"	22 5 0	22 15 0	
" Other brands	"	21 2 6	21 7 6	
Sheet	"	22 10 0	0 0 0	
Shot Patent	"	23 0 0	0 0 0	
Red or minium	"	23 15 0	0 0 0	
White Dry	"	28 10 0	29 0 0	
" ground in oil	"	0 0 0	0 0 0	



# THE BUILDING NEWS.

LONDON, FRIDAY, SEPTEMBER 4, 1874.

## ELASTICITY OF BUILDING MATERIALS.

WHEN two balls of ivory, hard wood, or metal impinge against each other with a force very much less than that which would suffice to break them, a rebound takes place one from the other, which is caused by a slight flattening having been produced at the point of contact; and the force of this recoil depends upon the power possessed by the material of resuming its former shape; this power is the measure of the "elasticity" of the body, or its tendency to resist any displacement of its fibres. No material is perfectly elastic; the fibres or particles of the body strained never exactly recovering their original position; hence a large succession of blows will gradually alter the shape of the body, provided they are not sufficiently strong to produce fracture. There are, however, many degrees of elasticity in various materials, which can be discovered by carefully-conducted experiments; thus, if two balls of the material to be tested are suspended by threads, so as to move in an arc of a circle, and allowed to fall towards each other from a certain height, they will not return to the point from which they started, but to some point short of it, the arc traversed in the recoil, as compared with that traversed in the descent, giving the measure of the "elasticity" of the material, or the ratio of the force of restitution to that of compression. In this way the relative elasticity of several bodies has been ascertained; taking 100 to represent perfect elasticity, or the distance on the arc or scale from which the bodies start toward each other, it is found that glass has the greatest power of restitution, its elasticity being as high as 94; that of hard baked clay is 89; of ivory, 81; of limestone, 79; of hardened steel, 79; of cast iron, 73; of soft steel and bell-metal, 67; of elm wood, 60; of brass, 41; and of lead, 20. This mode, however, of testing the elasticity of bodies tells us very little about the actual elastic force residing in the material; for although glass has a much higher elasticity than steel, yet a blow that would not make the slightest impression on the latter would smash the former to atoms. For practical purposes we have, therefore, to ascertain by a different class of experiments what force a body will withstand without injury to its elasticity or power of retaining the shape that has been given to it.

When a straight bar or rod of any hard material is fixed at one end, and a pressure applied to the other, a bending in the direction of the pressure will be produced, the amount of which depends on the relative proportions of the bar, and the amount of force applied. In some materials, such as brick or stone, the bending will hardly be perceptible, as the application of a weight that would produce any appreciable amount of flexure would fracture the material; with iron, steel, wood, and many other substances, the case is very different, the amount of bending being very considerable before injury or fracture takes place; when, however, the pressure is removed the bar never returns exactly to its original straightness, but retains a "set" or alteration of form, owing to the imperfection of its elasticity. Thus in an experiment that was tried on a small cast-iron bar whose section was the form of J, which was supported at each end and loaded in the middle, and of which the breaking weight was found to be 1,120lb., the deflexion in the centre, or deviation from a straight line, caused by a load of 14lb., was 1-40th of an inch, and the set after the removal of the load was just perceptible; with a load of 56lb. the deflexion was 4-30th of

an inch, and the set 1-200th of an inch; but with 112lb. the set was 3 times as great as with 56lb. Hence it appears that however small the strain the elasticity is to some extent weakened thereby, and, consequently, the resisting power of the material. Fortunately, however, the set does not go on increasing in any perceptible degree as long as the beam is loaded with a weight very much less than that which would cause fracture, this ratio varying in different materials from 1-3rd to 1-10th of the breaking load.

Another mode of testing the elasticity of a material is to subject it to a stretching force in the direction of its length; if the material was perfectly elastic it would, after being elongated by the force applied, return to its original length as soon as the strain was taken off; that it never does so is evident from the following experiments:—A rod of cast iron 50ft. long and 1in. square being subjected to a stretching force was found to require 16,000lb. to tear it asunder; but before this was done it was gradually strained by a succession of weights, and when the strain amounted to 1-10th of the breaking weight it stretched 11-150ths of an inch, and the permanent set when the load was removed was 1-500th of an inch; with double this load the rod stretched just twice as much, but the set was 1-100th of an inch, or five times as much as before; with half the breaking weight the extension was nearly  $\frac{1}{2}$ in., and the set 1-20th of an inch, the ultimate extension at the moment of fracture being 1in. Hence we see that cast iron, when subjected to tensile strain, possesses a high degree of elasticity as long as the stretching force applied is only a small proportion of the breaking force, since the "set" is but 1-30th of the actual extension produced by 1-8th of the breaking weight, and amounts to 1-15th of the extension when the strain is  $\frac{1}{2}$  of the breaking weight. We may therefore consider that for all practical purposes cast iron is perfectly elastic under a tensile strain as long as it does not exceed 1-8th of that which would tear it asunder: also that within this limit the elongation is proportional to the strain; hence if  $L$  is the original length,  $l$  the extension produced by a force  $S$ ,  $E$  a constant number called the "modulus of elasticity," then

$$l : L :: S : E$$

If we make  $l$  equal to  $L$ , then  $S$  will be equal to  $E$ ; and hence it appears that  $E$  is the force necessary to elongate a rod one square inch of section by a quantity equal to its original length. The value of  $E$  has been determined for many solid bodies by experiment, and is employed in all calculations of the resistance of bodies to change of form. If  $S$  is the force that will produce an elongation  $l$  in a rod 1in. square, then  $S \times A$  is the force which will produce the same extension, in one of  $A$  inches in section; or putting  $S \times A = F$ , we have  $S = \frac{F}{A}$ ; and since  $E : S :: L : l$ .

$$\text{Therefore } E : \frac{F}{A} :: L : l, \text{ and } l = \frac{F \cdot L}{E \cdot A},$$

$$\text{or, } F = \frac{E \cdot A \cdot l}{L}.$$

The value of  $l$  gives us the elongation produced by a given force  $F$ , and the value of  $F$  in the last equation gives the force required to produce a given elongation  $l$ . Putting  $S = \frac{F}{A}$ , we have  $F = S \times A$ . The "modulus of elasticity"  $E$  is the constant relation existing between the tension per unit of area, and the corresponding proportional elongation which it produces. From the foregoing experiment we can, therefore, deduce the numerical value of  $E$ , since  $E = S \frac{L}{l}$ ; and when  $S = 4,480$ lb.,  $L = \frac{50 \times 12}{1}$ ,  $\therefore E = 13,440,000$ lb., for cast-iron.

When a bar is subjected to a compressive force in the direction of its length, it is

shortened thereby in proportion to the force applied; but when the pressure is removed its elasticity enables it to return to its original length, or very nearly so, provided the amount of pressure has not approached near to that which would crush the material. An experiment of this kind was made on a bar of cast-iron, 10ft. long and 1in. square, inclosed in an iron frame to prevent bending, the compressing force being applied at one end. Under a pressure of 4,200lb. the bar yielded 1-23rd of an inch, and when the load was removed the "set" was scarcely perceptible, being only 1-14th of this decrement. Under 6,300lb. the compression was 1-15th of an inch, the set bearing the same proportion thereto as before. With a load of 8,400lb. the bar yielded 1-12th of an inch, but the set was 1-10th of the compression; also with 10,500lb. the set was in like proportion to the compression, which was a little over 1-10th inch. With an increase of the force the set increased more rapidly in proportion to the compression, being more than 1-8th of it when the load was 21,000lb. Taking the compression under a force of 8,400, we find the modulus of elasticity from the equation

$$E = S \frac{L}{l}, \text{ namely, } E = 11,454,545 \text{lb. for}$$

cast iron under compression.

When bars of wrought iron are subjected to tensile strains, they will stretch much more than those of cast iron before breaking, and the set is very small until the strain reaches one-half that which will tear the fibres asunder. A bar 1in. square, and 10ft. long stretched 1-22nd of an inch under a strain of 10,670lb., which was 1-5th of the breaking load, and on its removal it recovered its original length almost exactly, the "set" hardly amounting to 1-100th of the extension produced; with double the strain the extension was twice as great, but the set nearly four times as much as before; with half the breaking load the extension was nearly 1-8th of an inch, and the set 1-100th inch, or 24 times as great as with a strain of 1-5th the breaking load. In this case the elasticity was but slightly impaired under a strain equal to half that which would destroy the material, since the extension was in proportion to the force applied. Hence we find the value of  $E$  for this material to be 27,834,783lb. for tensile strain, by taking the value of  $l$ , when  $S = 10,670$ lb.

The elasticity of wrought iron under a compressive force has been determined by experiments similar to those employed for cast iron, by inclosing a rod 10ft. long and 1in. square, in an iron frame, to prevent it from bending. Under a pressure of 10,000lb., the decrement of length was 1-20in.; with 20,000lb., it was 2-20in.; and with 30,000lb. it was 3-20in.; showing that the law of compression being proportional to the load held good to that extent, and that the elasticity of the material was hitherto unimpaired; in this case the "set" increased nearly as the square of the compression at each renewal and removal of the load. Beyond 30,000lb. on the square inch, the compression increased with greater rapidity, the elasticity being evidently impaired thereby, so that we may consider this as the utmost compressive strain to which wrought iron can be safely subjected. Taking the compression under a weight of 20,000lb., we find, in the same way as before,  $E = 24,000,000$ lb. for wrought-iron under compression.

The value of the modulus of elasticity ( $E$ ) is required when we want to calculate the deflexion which a beam will undergo when supported at the ends and loaded in the middle; in which case the amount of deviation from a straight line is found by multiplying the weight into the cube of the length, and dividing by the moment of inertia of the section of the beam taken about its neutral axis, and by 48 times the modulus of elasticity. Hence the value of  $E$  can be calculated



by observing the deflexion produced by a given load. Thus, the moment of inertia of a rolled iron joist of I section is  $12(b \cdot D^3 - b \cdot t \cdot d^3)$ , where  $b$  is the breadth of the flanges,  $D$  the total depth,  $d$  and  $t$  the depth and thickness of the web; the deflexion of this beam was .016in. for every 2,240lb. laid on the centre, the span being 54in.; therefore,

$$E = \frac{W \times l^3}{48 \times .016} \times \frac{1}{12(b \cdot D^3 - b \cdot t \cdot d^3)} = 22,467,200\text{lb.}$$

the depth  $D$  being 5in.,  $d$  2½in.,  $b$  2½in., and  $t$  ½in.

By means of the modulus of elasticity we can therefore find how much deflexion to expect when a beam is subjected to a given load, and can regulate the dimension thereof so that its deflexion shall not exceed a fixed amount. When the load is uniformly distributed over the entire length of the beam, the deflexion at the centre is ⅘ths of that produced by the same load all applied at the centre.

The elasticity of steel is much more perfect than that of iron, and consequently it can be loaded with a greater proportion of its breaking weight without injury. A bar of hardened steel 1in. square being laid on two supports 54in. apart, a load was applied at the centre beginning with 50lb., and increasing gradually by that amount until it reached 1,400lb. Under 800lb. the deflexion was 1in., with 1,000lb. it was 1½in., and with 1,200lb. a little over 1½in., showing the increase of deflexion to be nearly as the strain. With a load of 1,200lb. a slight "set" was observed, amounting to .016in., which was quadrupled by the addition of another 50lb.; from this point the deflexion and set increased more rapidly, being 1.4-5ths of an inch and .133in. respectively, under a strain of 1,300lb., and with 1,350 the set was .429in.; hence it appears that the elasticity remained perfect until the load exceeded 1,200lb.

A bar of steel being subjected to a tensile strain, showed no indication of a set until the strain was one-half that which would tear it asunder, so that this material may be strained to that extent without injury to its elasticity. The same may be said of steel when it is subjected to a crushing or compressive force. The modulus of elasticity of the best steel is 31,000,000lb., but very much less for the inferior qualities.

Wood is a material whose elasticity is easily impaired, for if once it is bent it retains the curvature given to it, so that the strain to which it is subjected must fall very far short of that which would cause fracture. The moment of inertia of a rectangle about an

axis through its centre being  $\frac{1}{12} b d^3$ , where

$b$  is the breadth and  $d$  the depth, the value of  $E$  is obtained from the deflexion ( $\delta$ ) of a rectangular beam loaded in the middle and supported at each end, from the equation

$$E = \frac{W}{4\delta} \times \frac{l^3}{b \cdot d^3}$$

The deflexion of an oak beam 2in. square and 84in. long, was 1.28in. with a load of 200lb.; hence

$$E = \frac{200}{4 \times 1.28} \times \frac{84^3}{2 \times 2^3} = 1,447,031\text{lb.}$$

From this formula we can find the breadth to be given to a beam of known depth and span in order that the deflexion under a certain weight shall not exceed a fixed amount; for

$$b = \frac{W \cdot l^3}{4 E \cdot \delta \cdot d^3}$$

The modulus of elasticity for fir can be found by a similar experiment; the deflexion of a fir batten 3in. deep and 1½in. thick, with a span of 72in., amounted to ¼in. under

a load of 120lb.; hence  $E = \frac{W}{4\delta} \times \frac{l^3}{b \cdot d^3} = 1,105,900\text{lb.}$  for fir.

Another similar batten gave a deflexion of ⅓in. under the same load with a span of 8ft.; consequently we have  $E = 1,310,720\text{lb.}$  in this case; and another with 10ft. span deflected 1in. with the same load, giving  $E = 1,232,213\text{lb.}$ , which is about the average of the three numbers.

The importance of a knowledge of the elasticity of materials can scarcely be overestimated, since the bending or "sagging" of a beam supporting the wall of a house or other heavy permanent load will cause settlements in all parts of the building, even if it does not actually endanger the stability of the structure.

## COLOUR.—V.

### APPLICATION TO ART (continued).

**ILLUSION** has been made to the colouring of the ancients, and though we are not in possession of exact data, the employment of the primaries was so well adjusted and balanced that it is possible the classification of colours and the laws of contrast and gradation were at least empirically settled, and that the pleasing arrangements of colour seen on Egyptian and traced on Greek remains were not fortuitous associations dictated by the whim of the colourist of the day, but dependent on some definite rule. We know that Vitruvius, and other ancient authors, allude to certain harmonic ratios, and it is conceivable, although they were not able to explain the reason correctly, that certain proportions of colours were understood. We know there is a strong analogy between ocular and other sensations, as, for example, colour and sound, and we know that our preferences in both cases proceed from a simple physical cause, namely, the rapid and equal-timed succession of vibrations or pulsations, the pleasing sensation in each case being the result of regular or isochronous vibration, as in a musical note, or in the solar spectrum; and on the contrary, unpleasing or dull colours and sounds are so in the proportion to the irregularity of those vibrations. It has been shown, indeed, by Sir John Herschel and others, that the vibrations of two colours that harmonise have a simple ratio, the same ratio as between two nearest musical vibrations, or that of 4 to 5 or 5 to 4. Thus red and green, orange and blue, yellow and purple, are harmonic colours; for the number of undulations given to red or green multiplied or divided in the ratio of 4 to 5 or 5 to 4 gives the other harmonic green or red, and so on. It is also true, as we have seen before, that all modifications, tints, and shades of these harmonic colours produced by mixing with white or black are harmonic. Thus physical laws, or the sensuous impressions produced upon the retina, agree with the laws we have laid down, and show the employment of the pure or isochronous colours should be confined to smaller surfaces and objects, and that of the duller, non-isochronous to the larger and retiring surfaces, so that the existing impression of the brighter may be relieved by the sombrier tints.

But let us proceed to show how this great law of colouring may be applied. Owen Jones says "ceilings and cornices may be decorated with the primaries of prismatic intensity on the small surfaces of their mouldings; the walls, on the contrary, from presenting larger masses, should be of secondary colour, of low tones and hues; the dados still stronger in colour, and more broken in hue; the carpets should be darkest of all, composed of broken secondaries and tertiaries so interwoven and neutralised that they retire from the eye, both as furnishing repose for the colouring of the upper portions, and as backgrounds to the furniture." Here we have a complete practical illustration of colouring in obedience to the laws we have discussed; and it will be observed the nearer approach we make to the scientific principles of colouring, the greater will be the effective power of the colours we

employ. A few light tints well assorted as regards contrast of tone and hue will have far more effect than strong colours confusedly blended.

Two compound or secondary colours placed in juxtaposition, as a purple and orange, are discordant, but as each has a primary common to both—red, a nearer approach is made to harmony, the other colour approaching its component's opposite. Again, as the purple approaches to red, its discordance with the orange decreases, until when it becomes a purplish red its harmony with the orange becomes more evident. Thus, also, whenever a primary colour is associated with any of the three compound colours, harmony prevails, the greater the harmony as the compound is tinged with the opposite primary. A greater care is necessary in combining three colours. For example, if two compound colours, as purple and orange, are harmonised by making the orange rather yellowish, another positive yellow brought into juxtaposition would create a discordance, for it would throw the orangeish yellow back towards orange, and destroy the balance before subsisting. On the contrary, if, instead of yellow, red were introduced, the orangeish yellow would still further tend towards yellow by extinguishing its red component, and the three colours would be nearly complementary. In decoration, we repeatedly see these principles violated; the upholsterer or decorator, whenever he goes beyond the simple colours, and deals in secondaries or tertiaries, often gets perplexed—the complementary relations are unheeded. Thus in an apartment we may see the prevailing hues of the furniture and decoration of purple, orange, yellow, and blue. Now the blue would tend to bring out its complementary orange, and so increase the discord between it and the purple.

Again, contrast of tones, or variety in the depths of colours, must be considered. An insipid effect results from the colours being all light, and of the same depth, while harshness often arises from an equality of tone of strong colours; the latter defect is commonly observed. A few strong lines of colour of a deeper tone, or even three shades of the same colour, produce variety and brilliance. There is another difference to be observed by the colourist, namely, the contrast of warm and retiring, or cool colours. Red and yellow are the warm primaries, and all tints in which these prevail are more or less warm; while blue is the cold primary, and all hues of a bluish tendency are cool. This is a distinction of great importance in the practical application of colour, as we shall see. Two colours, one a warm, as a brown, and the other a cold, as a grey, juxtaposed, will, by the law of contrast, tend to increase the difference between them, and this fact should be carefully borne in view by the colourist. If a red line be interposed the contrast will be the same, but if the red line is placed as a border on the outer edge of the brown, the tints undergo a modification, and the contrast is less apparent. Again, if a panel is coloured with a warm tint and the margin with another warm tint, a red line interposed would reduce both to a cool shade; whereas if the line were of a decided cool colour, as grey, the warm tints are heightened in effect. By such simple bright lines or borders, or patterns of colour, any compounds or tints may be heightened or lowered in scale without altering the compound tints themselves. Cool tints should be of lighter tone than the warm one associated with them, and they are best in the large surfaces.

Another important distinction should be noticed; cool tints should be always placed on the retiring surfaces, as the sunken parts of soffits, panels, coves; the warm and darker tones on the more prominent parts and members. This is a principle of universal application, though we frequently see the projecting bands and architraves of ceilings and vaults tinted of a cooler colour than the sunken parts or coffer. Of course strong retiring



colours are to be avoided, as a strong blue for the walls of a room, though in the lofty vaulting of a church an ultramarine of some depth is often effective. In the latter case height and the effect of shade make it a proper colour. Having laid down the general axiom, that in the juxtaposition of colours, one colour should never be used to deprive another of its special hue, and the principles to be observed in the association of secondaries, their hues and tones, we will next endeavour to lay down a gradation or scale of colour for buildings and interiors, observing the important distinctions of those over, well, and under-lighted; their size and character, and other considerations determining the economical and proper distribution of coloured decorations.

#### RAINFALL AND STORAGE OF WATER.\*

WE are indebted to Mr. J. Bailey Denton, C.E., for some valuable and interesting information as to the average rainfall of England and Wales, the means of arriving at that quantity, and the proper and equal distribution of the surplus water to the whole country, by means of proper storage in reservoirs and tanks. It has certainly occurred to us that our rainfall is, under existing circumstances, rendered either positively mischievous or powerless. In one district it runs to waste, in another it inundates; at one period we complain of scarcity of this life-giving element, and at another of extreme abundance. Why, then, should we not husband the surplus, and equalise the bountiful supply which facts and figures give us? But let us look at them. It appears, taking the area of England and Wales at 37,324,883 acres, the mean annual quantity of rainfall on an average of years is 32in. Fifty years ago Dalton gave 30in.; but since that time Mr. Symons and others have, by carefully striking a mean from various observations collected over the country during a series of years, ascertained the average mean rainfall to be 32in. Mr. Denton tells us, having carefully examined the returns of published authorities, he can verify that estimate.

By a division of the country by the outcrop of the Lias formation from Whitby in Yorkshire to Lyme Regis in Dorsetshire, the mean of recorded averages on the east of that line is nearly 26in. This division contains about 16,000,000 acres. In the west division the average rainfall is 38in., and the area about 21½ millions of acres, including the Devonian hills of the south west, the Silurian range of Wales, and the Carboniferous limestone hills of the north which rise above the New and Old Red Sandstone and Coal-Measures. Of the eastern division two-thirds of the surface are porous, forming the water-bearing chalk strata, greensand, and oolite. The levels of this division vary from 10ft. in Lincolnshire to 700ft. above the sea level in the Downs of Sussex, Hants, and Wilts, a large area exceeding 200ft. The other division, the formation of which is partly the new Red Sandstone, has a much smaller proportion of absorbing surface; the remaining portions of this division being the Primitive, Transition, and Early Secondary rocks. The levels vary from a few feet to above 4,000ft., a large area being 400ft. above the level of sea. Now every inch of rainfall on an acre of area is equal to 22,622 gallons of water. Multiplying therefore this number by 32 inches, the average rainfall, and then by the number of acres in England and Wales, we get the immense product of 27,019,632 millions of gallons as the average amount of rain falling, exclusive of dew—no small item. These numbers, indeed, startle us; yet how unproductive, comparatively, is this prolific water-fall!

Now let us see what our requirements actually amount to, including sanitary, trade,

and domestic consumption. We are told the average quantity throughout the country for all purposes is, in round figures, 15 gallons per head per diem. This allows from 30 to 50 gallons per head in our large towns. Mr. Denton allows for increasing demand to the extent of 25 gallons per head. Now multiplying 25 millions, the population of England and Wales by 25 gallons, we get 625 millions of gallons per diem. The requirements of animals (which Mr. Denton puts at 5 gallons per diem to each) being considered, the total result becomes 250 millions of gallons per diem, considerably less than half the quantity required by the population. Further, allowing for the demands in steam and manufactures, &c., the aggregate cannot exceed 1,000 millions per diem, or 365,000 millions per annum, only a 74th part of the total rainfall given above. Thus it is seen that, allowing only one inch of rainfall to an acre of surface, a year's supply to about two and a half persons is guaranteed.

Speaking of the present disposal of this prolific rainfall, the storage of water in the earth accumulates only during the winter, when the rains produce supersaturation of the soil. The proportion of rain required for the flow of our rivers during the dry weather is estimated at about one-eighth of the average rainfall, or 4in. over the river watersheds.

In the east and midland districts the mean depth of water run off in the shape of floods barely reaches 6in., while in the west parts, Wales, the Lake district and northern counties, the mean is stated at 20in. Mr. Bateman, in his evidence before the Metropolitan Water Supply Commission, says it exceeded 40 out of 60in. in the high ground of Wales; and in the Lake districts Messrs. Hemans and Hassard put it at 65 out of 80in.

The character of the surfaces considerably modifies the quantity of subterranean storage. It is calculated that the average rainfall which is discharged by rivers without entering the ground is 15in., nearly half the average mean fall.

Mr. Denton alludes to the present drought, which is as much felt in the Lake district as any other. During the winter of 1872-3 the rainfall exceeded the average, and prayers were offered in our churches for drier weather; while in the winter just past the rainfall has been nearly as much below the average, and, indeed, it is shown the fall was less than any of the last six winters, being only 9in., while the mean is above 13in.

Now, to compensate for these inequalities of fall, the storage of the surplus water suggests itself. Mr. Denton computes this surplus at a mean of 15in. He also shows that, so far from diminishing the water-supply, the effect of under-drainage has been to increase it. No water can run from these drains until the subsoil and soil above them is in a state of supersaturation, or till the level of drains is also that of the water in soil. Mr. Denton assures us that the three millions of acres already drained discharge through the drains 150,000 millions of gallons as an average, or an effluent water equal to nearly half the water-supply required by the entire population of the country. This is important to notice. The under-drainage water from one acre of land is sufficient to supply four persons with an average of 25 gallons per diem all the year. Mr. Denton says "it may be assumed with certainty that there are at least 20 millions of acres out of the whole 37,324,883, which, in the aggregate, do throw off a mean of as much as 25in. of the rainfall which may be stored for useful application." This area would consist of the higher grounds, and would deliver its surplus waters "at an available mean height of at least 150ft." He therefore asserts "that a power equal to at least half that obtained from the use of coal might be secured from this source alone." These are at least suggestions of value when we find 30 millions of tons of coal annually consumed for steam power and locomotion.

As we are told, the manufacturing towns are in the west and north, where the prevailing height of surface is greatest, and where the surplus can be tangibly dealt with as a source of motive power. It was only the other day proposals were made to supply the metropolis with water from Wales or the Lake district, but since then, as we are told, towns in the north and west congratulate themselves that nothing was done; in fact, they begin to have an eye to the power they possess, but have hitherto neglected. Let us turn to Greenock, as an example of the profitable use or surplus waters. The contributing area of Shaw's waterworks supplies 650,000,000 cubic feet in the year, although Mr. Thom, the engineer, estimated only a supply of 553,930,000 cubic feet. Only in 1869 did the supply fail, but that was the driest year for forty years, and the storage is too small; in fact, they have to waste largely in winter.

Mr. Denton points out another advantage of storing the winter waters, viz., their use in maintaining the regular summer flow of rivers at a height above the minimum flow of dry seasons. The compensation of rivers (as, for example, the Thames in dry seasons, and when the flow is reduced by the abstraction of the water companies) by the stored surplus waters would be of great advantage. It appears the river flow of the Thames during a long period of the year is reduced much below the 500 millions of gallons, the proper allowance of flow per diem.

Now, what kind of storage is to be adopted for villages and rural districts? This will depend on locality. In some strata, as in chalk districts, underground tanks or caverns may be made, and simply lined with a facing of cement, thus being easily and cheaply formed. In other less favourable formations, concrete of the common lime, properly mixed with clean gravel and sand, or with burnt clay ballast, and even chalk, faced with Portland cement, make good tanks. In Selenitic cement we have a material admirably adapted as a facing, and much cheaper than Portland cement. Common lime must be thoroughly slackened before using; we should prefer a hydraulic lime, to prevent the slackening taking place after the tank is full.

Mr. Denton shows how, with an ordinary village house and outbuildings, provided with proper eaves, gutters, and downpipes discharging into a good tank, 20in. of water may be collected in the course of a year, or about 28,280 gallons; and in a small farm-labourer's cottage about 7,070 gallons. Of course, slate coverings are most desirable. Two to ten gallons of water per head per diem are, we are told, an ample supply for villages. Several villages may be combined, or a common tank, to hold a month's supply for the whole village, may be cheaply secured. Mr. Denton alludes to a tank filter he has lately invented, to be placed inside the tank, through which all the drinking-water may pass. It is made in earthenware by Messrs. Doulton and Co. Surface water may be collected in open reservoirs, but the wisdom of this is doubtful. Water may be delivered, we are told, in the village street at from 20s. to 25s. per head, including land, iron pipes, stand pipes, &c.; this would be about 1s. or 1s. 3d. per person per annum. A tank 16ft. long and 10ft. wide will hold 1,000 gallons per foot of depth, and a floating half-inch boarded roof may suffice as a covering, which reduces loss by evaporation. For drinking purposes a fixed covering is best. Subterranean tanks can only be adopted where the soil is naturally drained, and where no external water pressure exists. For field storage, ponds or underground tanks may be provided cheaply. Thus, an underground tank holding 2,500 gallons, Mr. Denton says, is sufficient for the cultivation of twenty acres. This would require a tank of 8ft. by 10ft. long and 5ft. below level of drains, costing about £15 in concrete. In conclusion, we commend Mr.

\* "The Storage of Water." By J. BAILEY DENTON, C.E., F.R.S. London: E. and F. N. Spon. 1874.



Denton's little pamphlet to all interested in this vital question, merely adding it is strange we have not already utilised, to a large extent, so self-evident a principle of health and economy. Legislative interference, however, is wanted to insist on the surplus of watersheds being economically housed, so that an excess of rainfall may be made to balance a period of drought.

#### THE MANUFACTURE OF COLOURS FOR PAINTING.\*

A COMPLETE treatise on the preparation of colours, embracing their classification, the raw materials, and the best formulæ for the preparation of pigments, and the necessary directions for their use in the arts, has been a desideratum in this country. In a volume before us, just published in America, the well-known work of MM. Riffault, Vergnaud, and Toussaint has been translated by A. A. Fesquet, and presented to English readers. The translation is from the edition by M. F. Malepeyre, comprises an account of pigments used by the ancients, the principles of Chevreul, a description of the raw materials and the modes of manufacture of all the pigments generally used, with the processes and machinery employed, and a collection of other useful facts and formulæ of great use to painters, manufacturers, and artists generally.

The introduction contains a brief and interesting account of the colours used by the ancients. The writings of Theophrastes, Pliny, and Vitruvius contain allusions to colours which were applied to buildings, and chemists have analysed them and given us some of the modes of preparation resorted to. Thus, the Egyptian white is remarkable as a fast pigment. Some, as Mérimée, think this white was sulphate of lime mixed with glue or mucilage. Davy, the celebrated chemist, analysed some of the whites found in vessels discovered in the baths of Titus at Rome, and corresponding with those of the fresco paintings of that palace, and found them and other ancient whites generally composed of carbonate of lime. None contained a trace of white lead, though Pliny and Vitruvius differ upon this point. The Egyptian pictures all had a priming of white, the colours being applied upon this. The kind of size used is not known, unfortunately, indeed, because the pictures are not cracked, as so many later works. The gum of the *Mimosa* tree has been credited; gelatine glue was also known; but some mucilage was no doubt employed.

Of blacks, ancient writers describe those of Greece and Rome as carbonaceous substances manufactured from calcination of soot, burned resins, &c. Davy says the ancients were cognisant of the manganese ores from their paintings on glass. Browns are also thought to be mixtures of ochres and black.

In the baths of Titus, Davy discovered a large pot holding yellow paint, which, upon analysis, was found to be a mixture of yellow ochre and chalk. Other kinds of yellow ochre mixed with different proportions of chalk and red lead were also found. The ochre of Athens was most famous. French chemists have found two kinds of yellow used by the Egyptians—one yellow ochre, and the other a sulphide of arsenic (orpiment). The red in use by them is a calcination of yellow ochre. Vermilion was, no doubt, used. The reds of the Greeks and Romans were red lead and cinnabar, or vermillion; the latter was detected by Davy upon the walls of the baths alluded to, since metallic mercury was obtained by calcination with iron filings. According to Pliny, vermillion was highly esteemed by

the Romans, and its value rose so high that Government fixed its price. In the same baths a pink colour was found, but after subjection to several tests, this learned chemist found it impossible to determine its exact origin, and observes, if of animal origin, it may be Tyrian or marine purple. Davy found no instance of its use in the old fresco paintings, the purple reds of the baths of Titus being mixtures of red ochres and copper blues.

The Grecian purple, or Tyrian purple, was a highly-prized colour among the Greeks and Romans. It was extracted from a shell. Vitruvius says the colour varied with the shell, and was obtained by heating the shell with iron tools; the purple liquor separating thereby from the debris of the animal was mixed with a certain proportion of honey. Dr. Baneroff says it was a univalve shell (*Murex*) found on the Mediterranean shores. During the latter Roman Empire this purple was restricted to dignitaries under penalty.

Various kinds of blues were used by the ancients. Egyptian blue resists the action of heat, acids, and alkalies, and has retained its brightness after thirty centuries. Vitruvius gives the preparation, which was by trituration together copper-filings, sand, and natron, and forming balls, afterwards heated in a potter's oven. Davy concludes the colouring matter was oxide of copper, the residue was alumina and carbonate of lime. Those blues, says Davy, are pale or dark, according to the proportion of carbonate of lime, and when the latter is removed by acids they all have a highly-communited blue powder like the finest smalt and ultramarine, which dissolve in ammonia. M. Girardin, Professor of Chemistry at Lille, analysed a light blue found in a Gallo-Roman city, and after treatment with weak hydrochloric acid, which removed part of the carbonate of lime, the residue showed similar components, copper, silicious sand, and soda ash.

Of greens, those examined by Davy in the Baths of Titus were all copper compounds, as oxide and carbonate of copper. The ancients were well acquainted with verdigris. Davy says "when frits cannot be employed, the experience of seventeen centuries demonstrates that the best colours are metallic combinations, insoluble in water, and saturated with oxygen or some acid substance. In red ochres the oxide of iron is saturated with oxygen; in the yellow ochres the metal is combined with oxygen, and sometimes with carbonic acid. These have remained unchanged. The carbonates of copper, which contain an oxide and an acid, have been but slightly altered."

The conclusion of most minute investigations of ancient monuments have shown to chemists the following colours, and no others: white, black, yellow, brown, red, blue, and green.

The origin, definition, and classification of colours, and the nomenclature of M. Chevreul, form the first four sections of the work. As we have only lately referred to this subject, we may pass on to notice the general method of preparing colours. According to the remarks of Mr. Kletzinsky, a skilful chemist, the wet way is preferable to the dry way in the chemical manufacture of colours. The mechanical operations of pulverising, sifting, grinding, and even levigating (floating), are insufficient to arrive at a molecular comminution equal to that obtained by the wet way, or by the precipitation of a colouring substance by the mixture of two pure solutions. It is an acknowledged fact that the freshness, intensity, tone, body, and admixture of a pigment are due to the degree of comminution of the molecular grain. Thus the vermillion produced by precipitating a salt of oxide of mercury with a sulphur solution is far superior to all other kinds of cinnabar obtained by the dry process of sublimation. Again, in mixtures for artistic and other purposes, it is very necessary to comminute each compo-

nent colour, so as to make the admixture as intimate as possible. Thus if we require a green, by mixing together a chrome yellow and Berlin blue, the particles should be so fine that the blue and yellow rays will be reflected from the same point, and will blend and produce the optical effect.

The principle of "mixeolytical," colours, or the wet method, is this:—"Choose two couples of solutions in such a manner that each couple is capable by itself, when mixed, of producing a precipitate possessing all the necessary qualities of a chemical colour."

Let *a* and *b* and *c* and *d* be these two couples of solutions, and *a* and *b* producing the blue, and *c* and *d* the yellow. If, now, we chemically choose such solutions, that *a* and *c* and *b* and *d* be mixed without decomposition or the production of undesirable precipitates, we have realised the "principle," since the mixture of the double solution *a* and *c* with that of *b* and *d* will give the precipitate of the new mixeolytical green colour, and their precipitated pigment will have a fineness and uniformity of hue not to be attained by grinding and mixing. By these combinations, a boundless series of mixtures may be produced of different hues.

Taking an example of a deep green:—

MIXED DOUBLE SOLUTION (a c).	MIXED DOUBLE SOLUTION (b d).
Neutral chromate of potassa.	Yellow, Acetate of lead.
Yellow prussiate of potassa.	Blue, Ditto.

We have not space to enter into the minute description of the processes employed in the preparation of colours, but we may make a few notes. Chalk white and white lead were at one time the only whites in use, but now several new whites, as zinc-white, baryta-white, have been employed for house-painting. Of whites with lime basis we have the chalk, or carbonates of lime, well known to our readers, some rather yellowish and grey. Prepared or Spanish white is ground in a mill and formed into rolls; for painting, its further purification is effected by stirring in clean water, allowing it to settle, decanting the first water. Washing is repeated, and the chalk floated into another vessel after passing through a silk sieve. It is again decanted, and the pasty white residue is formed into rolls and allowed to harden in the air, and are then ready for painting, whitewashing, &c. Mr. Lazé says a well-prepared chalk-white, mixed with a little blue and a dryer, may be employed for oil painting.

The whites with lead basis are those which form the basis of all house and artistic painting. The finest are those manufactured at Krens (Hungary). The Clichy process of manufacture by the precipitation of a basic acetate of lead with carbonic acid is commonly adopted. Litharge has been largely used in its manufacture, and in order to produce an amorphous carbonate, or white lead, from litharge, the oxide of lead should be combined with a small proportion of acetic acid, so that the resulting basic acetate is insoluble, and there should be just enough dampness to allow of the action of the carbonic acid. This process is practised largely near Birmingham. The proportion of acetic acid used is less than 1-300th of the weight of litharge, which should feel simply moist. The carbonic acid is obtained by the combustion of coke, and machinery is employed to assist the gas in its action upon the litharge. It is a fact not generally known that white lead destroys the colouring principle of linseed oil.

The Kremnitz process of manufacture of white lead is an improved one, and requires oxides of lead and acetic acid, or acetate of lead and carbonic acid. Any oxide known to the trade will do, as litharge and massicot. The following is the method of manufacture: The oxide is ground to a powder, and mixed with the proper proportion of acetic acid, and a sufficient quantity of water to make a paste.

\*"A Practical Treatise on the Manufacture of Colours for Painting, &c." By MM. RIFFAULT, VERGNAUD, and TOUSSAINT; revised by M. F. Malepeyre, and translated from the French by A. A. Fesquet, chemist and engineer. Philadelphia: Henry Carey Baird. 1874.



This is spread over trays covered with sheet lead, and is placed in a room into which a stream of carbonic acid, either pure or mixed with other gases, enters. This gas becomes absorbed, and combines with the oxide of lead to make *céruse* or *white lead*. The absorption is facilitated by stirring the layers of lead. The oxide gradually becomes white and transformed into carbonate. We have not space here to describe other processes, but hope to return to the book.

#### ARCHITECTURAL ASSOCIATION ANNUAL EXCURSION.

THE fifth of these most agreeable and profitable excursions has just been made with the success attending those of previous years, and the event has completely justified the expectations of all who considered that an excursion to the Continent was not impracticable. The district to be visited was happily chosen, Paris being selected for the base of operations, and the tour being arranged to include a cluster of surrounding ecclesiastical edifices of note, within a hundred miles distance, taken, as far as possible, in chronological sequence. This ambitious project necessarily involved an excursion of longer duration than former ones, but the excellent arrangements made by the secretaries beforehand enabled those who took part in it to accomplish the entire tour within a fortnight's holiday, whilst considerate provision was made for those who had even less time at command to join or leave the party at the end of the first week. As on previous occasions, the members had the great advantage of Mr. Edmund Sharpe's guidance, every one of whom must have felt under personal obligation to him for disinterested services which contributed so much to the ultimate success; and, to crown all, the weather was faultless throughout.

Monday, the 17th of August, was fixed for members to assemble at Paris, each being left to proceed there by the route most convenient to himself. The writer crossed from Newhaven to Dieppe for the first time, and was much struck with the lovely country along the banks of the Seine, the effect of which was greatly heightened by a magnificent sunset, and the fact of it being harvest time. On arrival in Paris, it was found that the party consisted of no less than 58 persons, most of them architects in actual practice, and including some well known in the profession.

#### FIRST DAY.

The tour commenced with a visit on foot to the Church of St. Germain des Pres, a twelfth-century edifice of Byzantine character, the nave arcade having semicircular Transitional arches. All the vaulting was coloured—that over nave much too heavily.

The Chapel of the Hôtel Dieu was next visited, though not in the original programme, and certainly well deserved the time spent over it. This Transitional structure is almost uniquely vigorous in design; and for the convenience of those wishing to measure the building, the chapel was opened in the afternoon—a concession of which several availed themselves.

Next in turn came the adjoining Cathedral of Notre Dame. Here some time was lost in obtaining access to the choir, the floor of which was covered with a most costly carpet. The rolling of it up, however, by several willing members soon disposed of this difficulty, and Mr. Sharpe, assisted by the sacristan, who spoke excellent English, and addressed the members from the altar-steps, explained the various features of interest, after which the sacristy and its treasures were hastily inspected. The west front of the Cathedral is being opened out by the removal of very important buildings, to form a square, which, it is said, will be the finest in Europe when finished, and three new streets are to be driven through Paris converging to this point. The western towers are also to be completed, and the Cathedral encircled by a costly railing of bronze.

La Sainte Chapelle is now in course of restora-

tion, but the interior of the upper chapel was visited. The architecture is lost in one mass of gold and colour, the floor even being richly inlaid.

From thence the company proceeded to the Church at Montmartre, overlooking Paris. Its tri-apsidal east-end is in course of restoration, the nave being screened off, and the church contains several marble shafts and other remains of Roman work. For want of a tower, a timber bell-cage about 40ft. high has been erected outside. It is on this hill that an important new church, dedicated to the Sacred Heart, is proposed to be built, for which a competition has lately taken place.

After dinner in the evening, Mr. Sharpe addressed the members at some length, going carefully into the chief characteristics and classification of the nomenclature of French architecture, illustrating his remarks by impromptu diagrams in charcoal.

#### SECOND DAY.

Tuesday was well spent in a visit to Senlis by road, St. Denis, Gonesse, and Noyeau being seen on the way, and the journey undertaken in two special coaches, each drawn by a team of five horses. The Abbey Church of St. Denis, the burial-place of the Kings of France from very early times, is a glorious pile, worth weeks of study, and considered one of the finest buildings of the Geometrical period in France. It is now in course of restoration on an extensive scale, having suffered much at the time of the great Revolution, the royal tombs being then rifled. Particular attention was directed here to the detached banded shafts of windows and domical vaulting of eastern chapels and double ambulatory, the date of which was stated to be 1240-1260. A fine crypt contains many valuable remains of demolished tombs and other carving.

Gonesse possesses a church of good proportions, erected in the latter half of the twelfth century. The nave is not vaulted, but has a waggon-roof with king-posts and tie-beams. The double tracery of clerestory windows was thought to have been originally intended for the blind story.

Noyeau was passed on the way to Senlis, and its church hurriedly inspected.

Senlis was reached about 5 o'clock in the afternoon, whereupon the Church of Notre Dame, one of the best examples of the Transitional period, was gone over. Its apse, of horseshoe form, is very peculiar, and the carving throughout was fine. Remains exist of earlier work, dating from the eighth century. The members of the Association were here met by a deputation from the local society of architects and archaeologists, who elucidated many features of interest in the Cathedral and other churches of Senlis, including the Church of St. Vincent, and the desecrated churches of St. Frambourg and St. Pierre, the latter at present used as a military stable.

#### THIRD DAY.

Early in the morning M. Vernois, one of the deputation of the previous evening, kindly accompanied the party to the ruins of a Roman theatre in the precincts of Senlis, dating from the fourth century, after which the journey was made by road to Cires-les-Mello, the churches of Montataire, St. Vaast, and Mello, being seen on the way.

Important quarries lie between Montataire and St. Vaast, yielding a stone similar in appearance to that of Ancaster, but in much larger blocks. From Cires-les-Mello train was taken to Beauvais, where the party arrived about 3 o'clock. The cathedral church consists of a choir and transepts of immense height; indeed, it is the loftiest church in Europe, and contains good glass, but the wall decorations in course of execution were generally condemned. In the north transept is a new clock of wonderful intricacy, which the inventor personally explained through Mr. Sharpe's mediation.

The church of St. Etienne, a twelfth century

building, with Flamboyant additions, and fine old glass, was seen in the course of the afternoon.

#### FOURTH DAY.

From Beauvais the party returned early to Cires-les-Mello, from whence the journey was continued by coach through Chambly, Beaumont-sur-Oise, Champagne, Jouy-le-Comte Anvers, and Taverny, to Herblay Station, and afterwards by train to Paris. These places possess a string of parish-churches of unusual interest, that of Jouy-le-Comte having a remarkably good saddle-back tower, but the church of Champagne being in course of restoration, without the least regard to the character of the original work. At Anvers the benches were ingeniously arranged with sliding ends, for the purpose of providing extra seats in the aisle: when required, a contrivance likely to recommend itself to English architects in preference to chairs.

#### FIFTH DAY.

Friday was taken up in a visit to Mantes and Evreux. Mantes possesses a fine church, which is now being carefully restored under the direction of M. Alphonse Durand. Its traceried windows were greatly admired.

At Evreux the Church of St. Taurin was rendered attractive by the exhibition of its noted chasse of silver-gilt and thirteenth century workmanship, the church itself being also interesting for its early features, Flamboyant apse, and good stained glass. The Cathedral at Evreux was next entered, and found to be in the hands of workmen engaged in taking down four western bays of the nave, on account of their supposed insecurity; of which, however, no evidence existed at the time of the visit, although the flying buttresses had been already removed. A striking feature of this Cathedral is the open lantern at the crossing, and the internal arrangements remind one strongly of some of the large open churches in Belgium. The old glass, too, deserves special mention.

#### SIXTH DAY.

Saturday was devoted to Chartres, Mr. Penrose acting as guide in the absence of Mr. Sharpe, who was laid up from cold. Most of the day was spent in its glorious Cathedral, the vastness and richness of which were simply bewildering. The glass alone was worth a special pilgrimage. The church of St. Pierre, a structure of the Lancet period, also gave great satisfaction, especially the ancient glass with which most of the windows were filled. The desecrated church of St. Andre, now used as a government store, afterwards occupied attention, and the first week's work was brought to a fitting close by a dinner at Paris, at which the services of Mr. Sharpe were heartily acknowledged, many gentlemen leaving for home the same evening.

#### RETAINING WALLS.

IN a paper read by Mr. C. Constable, C.E., to the American Society of Civil Engineers, in April last, an interesting contribution towards this rather recondite subject is given. We will here briefly give the gist of the remarks. The stability of retaining walls is expressed simply by the equality of two moments, the weight of wall multiplied by its leverage, and the thrust of a triangular prism of earth multiplied by its leverage, the fulcrum being the intersection of line of pressure or resultant thrust, and the line of rupture of the wall; for equilibrium equality of these moments should obtain. Mr. Constable notices that light walls stand sometimes better than thick ones, even when lighter than the accepted theory makes them. On the other hand, walls stronger than theory allows have failed. Now these instances, as he shows, proceed from improper construction or imperfect backing, and excessive factors of safety have been employed. After all, in the construction of a retaining wall lies the secret; and mere formula-built walls, without precaution in providing drainage through "weepers" or otherwise, and in properly ramming and forming the backing, are often faulty. Again, if more care were taken, formulas could be more relied upon.



Mr. Constable shows, by experiment, that the generally-received idea of a wall turning over as a solid body rupturing along its bed, is not borne out, but that the wall breaks along the line of natural repose of the backing. The height of the prism of pressure is then reduced. The angle at which the masonry ruptures appears to be correctly about  $45^\circ$ , the angle of repose of broken stone, but for safety's sake it may be assumed to be that of the backing. In this case the height of prism becomes 0.75 the height of wall. This condition shows a less weight of wall, and a less weight of pressing earth to be taken into account, and the formula for rectangular walls, where there is no superimposed load, becomes—

$$t = .53 \tan \frac{a}{2} \sqrt{\frac{w_1}{w}} \cdot (A),$$

where  $t$  = thickness at top,  $a$ , the angle of repose of earth with the vertical =  $90^\circ$  - angle of repose;  $w$ , the weight of a cubic foot of masonry, and  $w_1$ , that of earth. If the prism started at the foot of wall, or the wall turned bodily over, as supposed, the formula becomes—

$$t = .57 \tan \frac{a}{2} \sqrt{\frac{w_1}{w}} \cdot (B),$$

which is the usual formula. The difference is about 8 per cent.

Experiments with blocks of pine representing bricks, backed by oats, showed this line of rupture to be at an angle of  $45^\circ$ . In this experiment the angle of repose was  $30^\circ$  with horizon. The wall bulged when it began to yield, the centre of curve being about the centre of its height. Only a jar would give it a fresh start, and in practice old walls are often seen in such a threatening position for years. The shearing of the wall was established beyond doubt. A series of experiments showed the formula given above to be very correct, and we give the table of results as useful:

Height of Walls.	Thickness.		
	By Experiment.	Formula A.	Formula B.
5	2½	2.28	2.46
7	3	3.15	3.44
10	4	4.40	4.90
12½	5	5.51	6.00

It will be seen the results of experiment and Formula A are very close. Formula B shows the results given by the old form. The difference, however, errs on the safe side.

In the case of surcharged walls, the formula, when modified, gives close results. The formula given is—

$$t = 0.38 \cos. \phi \sqrt{\frac{w_1}{w}} h \cdot (C),$$

$h$  being height of wall, the surcharge being supposed to start from back of wall.

In the absence of a table of cosines, the following may be of use in an engineer's note-book. It is carefully calculated from Formula C.

	No. Factor	Factor of Safety = 2.*						
	$\frac{w_1}{w} =$	1.0	1.0	0.9	0.8	0.7	0.6	0.5
Angle of repose, with horizon.								
28°	.3355	.470	.445	.418	.395	.364	.330	.300
30°	.3291	.461	.440	.412	.387	.357	.327	.295
32°	.3222	.451	.429	.403	.380	.350	.320	.283
34°	.3150	.441	.420	.394	.370	.342	.313	.278
36°	.3074	.430	.410	.384	.360	.333	.305	.270
38°	.2994	.419	.398	.375	.350	.325	.300	.265
40°	.2911	.408	.388	.365	.340	.316	.290	.257
42°	.2823	.395	.375	.353	.330	.306	.280	.250
44°	.2732	.383	.364	.342	.320	.297	.270	.240
46°	.2640	.370	.352	.330	.311	.287	.263	.233

\* That is the earth prism is assumed at double its real value, when in equilibrium—hence Column 3 is Column 2 multiplied by  $\sqrt{2}$ .

To transform a rectangular wall into one of equal stability, the rule is given: Revolve the face line to the proper batter; about a point on this line

situated above the bottom 1-10th the height of wall, the resulting profile is one of equal stability. Mr. Constable's practice has been to make the base of the wall 2-5ths its height, but this supposes first-class masonry and cement. The operations of frost also should be considered by making the work heavier.

## Civil Engineering.

### FAILURE OF A RESERVOIR DAM.

A REPORT published in the Transactions of the American Society of Civil Engineers, by Messrs. J. B. Francis, Theodore G. Ellis, and W. E. Worthen, Civil Engineers, throws some light on careless design and workmanship of this species of construction that may be interesting to notice. The dam is situated on the Mill River, in the town of Williamsburg, Hampshire county, Mass. The river mill is a small stream entering the Connecticut river. The dam was built in 1865. It is between 500 and 600ft. long and 43ft. high at the centre, diminishing to nothing at the ends; and forms a reservoir, when filled in the valley above, of an area of 111 acres. The average depth is about 20ft. It appears the water was about 4ft. below the top of embankment at the time of failure, though the water had been a foot higher.

The failure occurred on the 16th of May last, and the escape was rapid, three quarters of the contents having rushed out in about 20 minutes, or at the rate of 60,000 cubic feet per second, in its torrent destroying 143 lives and property to a large extent. The embankment of the dam was of earth, with a longitudinal wall of stone and cement through its centre, a waste way of 33ft. in the natural ground at one end of it. A 16in. pipe at the lowest points, through the embankment, discharged the water as required by the mills below. The specification carried out was one prepared by Mr. Lucius Fenn, C.E. of New Britain, who claims to have written it under the directions of the Committee—a rather curious procedure. We gather from this document that the slopes were of one and a half to one on each side, and the embankment was 16ft. wide at top. The longitudinally-placed wall was of "good rubble," its height being 42ft. above bed of stream, and 2ft. thick; and increase in thickness downwards with a batter of 1in. per foot, making the bottom thickness 5ft. 9in. The wall was bonded and grouted with the best hydraulic lime and sand. The top 10 or 15ft. was in mortar, with 25 per cent. of quicklime mixed with 75 per cent. of hydraulic lime, instead of being grouted. It further specifies for the removal of all perishable materials under the embankment, and the earth to be rammed each side of the wall for a distance of 5ft.

The report shows that from the unbinding quality of the gravel used for the embankment, reliance was placed upon the cement wall, the slopes being only intended to support and protect the rubble core. Now it appears the foundations of this core or wall were laid in trenches only 3ft. deep; and no idea was entertained of the pressure of such a head of water making a passage beneath this wall; in fact, the embankment of earth was considered sufficient to prevent this. It is evident, however well-rammed the porous material of the embankment may have been, a 40ft. head of water was overpowering.

Another point is noticed—that the rate of slope was not enough. On the outside 2 to 1 is recommended, and on the inside a batter of 2½ to 1. The effects of frost were not considered, the embankment only covering the wall to a height of 2ft., whereas 5ft. was required in that climate. On examining the workmanship it was found to be very defective, in some places the bottom of the wall did not rest even on the hard-pan; it was even asserted in evidence that the wall was laid up dry, and grouted 5ft. at a time. The Specification had been badly carried out, and the im-

mediate cause of the failure was imputed to the percolation of the water under the wall "causing a slip in the embankment on the down-stream side of the centre wall, which being then unsupported yielded to the pressure on the upper-side." No doubt the percolation of the water through the embankment material was the original cause, and this percolation gradually undermined the wall by entering cavities.

### THE INSTITUTION OF CIVIL ENGINEERS.

SUBJECTS FOR PAPERS.—SESSION 1874-75.

THE Council of The Institution of Civil Engineers invite communications, of a complete and comprehensive character, on any of the Subjects included in the following list, as well as on other analogous questions. For approved Original Communications, the Council will be prepared to award Premiums, arising out of special funds bequeathed for the purpose, the particulars of which are as under:—

1. The TELFORD FUND, given "in trust, the Interest to be expended in Annual Premiums, under the direction of the Council." This bequest (with accumulations of dividends) now produces about £250 annually.
  2. The MANBY DONATION, given "to form a Fund for an Annual Premium or Premiums for Papers read at the meetings," of the value of £10 a year.
  3. The MILLER FUND, bequeathed by the testator "for the purpose of forming a Fund for providing Premiums or Prizes for the Students of the said Institution, upon the principle of the 'Telford Fund.'" This Fund (with accumulations of dividends) now realises nearly £165 per annum. Out of this Fund the Council have determined to establish a series of Scholarships,—to be called "The Miller Scholarships of the Institution of Civil Engineers,"—for Papers from Students, and to award one such Scholarship, not exceeding £40 in value, each year, and tenable for three years.
  4. The HOWARD BEQUEST, directed by the testator to be applied "for the purpose of presenting periodically a Prize or Medal to the author of a treatise on any of the uses or properties of iron, or to the inventor of some new and valuable process relating thereto, such author or inventor being a Member, Graduate, or Associate of the said Institution." The income amounts to upwards of £16. It is proposed to award this prize every five years, commencing in 1877.
- The Council will not, in any case, make an award unless a communication of adequate merit is received; but, on the other hand, more than one Premium will be given, if there are several deserving memoirs on the same subject. In the adjudication of the Premiums no distinction will be made between essays received from a Member, an Associate, or a Student of the Institution (except in the cases of the Miller and the Howard bequests, which are limited by the donors), or from any other person, whether a Native or a Foreigner.

#### LIST.

1. On the Flow of Fluids and Gases.
2. On Portable Apparatus for Gauging the Materials, and for the Expeditious Mixing of large quantities, of Portland Cement Concrete.
3. On the Value and Strength of the different Materials used for making Concrete: comparing, for example, Portland cement with hydraulic lime, shingle with iron slag or quarry rubbish, coarse river with fine sea sand, together with Experiments on the Proper Proportions of each, and of the Water, whether salt or fresh, to produce the Strongest Mixture.
4. On the Manufacture as now practised of Iron and Steel of various qualities; on the effect on the Strength and Tenacity of the Metal of the Admixture of Foreign Substances; on the various Experimental Tests by which the Quality may be ascertained; and on the effects of extreme Temperatures on Metals.
5. On the Process of Forging by the Hydraulic Press, and on Effects of Pressure on Cast Steel in the mould.
6. On the Results of Experience in the recent Extended Use of Steel in Mechanism and in works of Engineering.
7. On the Construction of Warehouses and other buildings for storing Goods, with the Special View of resisting Fire, and on the relative Merits of brickwork, iron, and timber for that object.
8. On the Construction of Street Tramways, the best means of adapting them for the conveyance of passenger and goods traffic, and the best method of avoiding evil and inconvenience to other carriages travelling on the same roads.
9. On the Modern Methods of Constructing the Foundations of Bridges.
10. On Viaducts with Metallic Arches of Large Span, considered with special reference to the Strains resulting from changes in Temperature, and Structural Provisions for reducing or eliminating such Strains.
11. On the Design, generally, of Iron Bridges of very large span, for Railway traffic; and on the Comparative Merits of European and American Wrought-Iron Railway Bridges.
12. On Dock Gates and Caissons, including a Description of the requisite external and internal arrangements, with recent practical examples.
13. On the Appliances and Methods used for "Tunnel Driving," Rock-boring, and Blasting in this country and abroad, with details of the cost and of the results obtained.



14. On the Permanent Way of the Railways of 1874, and the extent of its identity with the Permanent Way of 1834, in respect to the rails, fastenings, and sleepers generally; with statistical tables showing the length of road laid with the double-headed chair-rail and the flat-footed rail in different countries at the present time.

15. On the Block Systems of Signalling on Railways, and of Means of Communication with trains in Motion.

16. On Sorting Sidings for Railway Trains.

17. On the Constant Service of Water Supply, with special reference to its introduction into the Metropolis, in substitution for the Intermittent System; and on the Waste of Water, and the best apparatus for its prevention.

18. On the various Modes of Dealing with Sewage, either for its disposal or its utilisation.

19. A History of any Fresh-Water Channel, Tidal River, or Estuary—accompanied by plans and longitudinal and cross sections of the same, at various periods, showing the alterations in its condition,—including notices of any works that may have been executed upon it, and of the effect of the works.

20. On the relative Value of Upland and of Tidal Waters in maintaining rivers, estuaries, and harbours.

21. On the System of River and Canal Towing in use on the Continent of Europe.

22. On Recent Improvements in the Construction of Steam Boilers adapted for very High Pressures.

23. On the best practical Use of Steam in Steam Engines, and on the effects of the various modes of producing Condensation.

24. On the Results of Experiments on Steam Jacketing.

25. On the Modern Construction of Marine Engines, having reference to Economy of the Working Expenses, by Superheating, Surface Condensing, High Pressure, great Expansion, &c.

26. On the construction of portable Steam Engines, or other Motors, of very light weight, suitable for boats, aerial machines, &c.

27. On the relative cost of the Conveyance of Coal by Rail and by Steamer.

28. On the various descriptions of Pumps employed for Raising Water or Sewage, and their relative efficiency.

29. On the employment of Water as a Motive Power, its relative advantages and disadvantages compared with Steam Power, and the Hydraulic Motors most suitable for utilising the power in the best manner.

30. On the best Methods of Removing Grain in bulk from a Ship to a Warehouse, for distributing in the Warehouse, and on the various modes in which the grain is stored in bulk.

31. On the Methods of transmitting Force to distant points; and on the details of the existing systems of Rope Transmission.

32. On the Present State of Science with regard to the Manufacture, Purification, and Distribution of Coal Gas.

33. On the Manufacture of Mineral Oils, and the Lamps best adapted for their consumption in dwellings and lighthouses.

34. On the "Output" of Coal in the United Kingdom, as compared with that of other countries, illustrated by statistical tables, plans, and diagrams, showing where Coal is produced, and where and how it is consumed.

35. On the Sinking to, and Machinery applied at, deep Coal Mines (in Saxony, for instance), with a notice of the modifications necessary in future Coal Mining Operations suggested (or indicated) by the working of deep sinkings.

36. On Compressed Air as a Motive Power for Machinery in Mines, with some account of its application on the Continent.

37. On the Dressing of Lead, Copper, and other Ores by any other process than that of Water.

38. On the Smelting of the Ores of Lead, Copper, Zinc, and Tin, with details of the results and cost by different methods.

39. On Pneumatic Telegraphs, and on Pneumatic Despatch Tubes, designed with a view to economical working, and to the attainment of high speeds in long lengths of pipe.

40. On recent Progress in Telegraphy, including a notice of the theoretical and practical data on which that progress has been based, with some account of the improvements in the construction of land and sea lines and in the working instruments.

INSTRUCTIONS FOR PREPARING COMMUNICATIONS.

The Communications should be written in the impersonal pronoun, and be legibly transcribed on foolscap paper, on the one side only, leaving a sufficient margin on the left side, in order that the sheets may be bound. A concise abstract must accompany every Paper.

The Drawings should be on mounted paper, and with as many details as may be necessary to illustrate the subject. Enlarged Diagrams, to such a scale that they may be clearly visible when suspended in the Theatre of the Institution, should be sent for the illustration of particular portions.

Papers which have been read at the Meetings of other Societies, or have been published in any form, cannot be read at a Meeting of the Institution, nor be admitted to competition for the Premiums.

The communications must be forwarded, on or before the 31st of December, 1874, to the house of the Institution, No. 25, Great George-street, Westminster, S.W., where any further information may be obtained.

CHARLES MANBY, Honorary Secretary.  
JAMES FORREST, Secretary.

#### EXCERPT BYE-LAWS, SECTION XV., CLAUSE 3.

"Every Paper, Map, Plan, Drawing, or Model presented to the Institution shall be considered the property thereof, unless there shall have been some previous arrangement to the contrary, and the Council may publish the same, in any way and at any time they may think proper. But should the Council refuse, or delay the publication of such Paper beyond a reasonable time, the Author thereof shall have a right to copy the same, and to publish it as he may think fit, having previously given notice, in writing, to the Secretary of his intention. No person shall publish, or give his consent for the publication of any communication presented and belonging to the Institution, without the previous consent of the Council."

#### PREMIUMS AWARDED.—SESSION 1873—74.

The Council of The Institution of Civil Engineers have awarded the following Premiums:—

1. A Telford Medal, and a Telford Premium, to Blin- don Blood Stoney, M.A., M. Inst. C.E., for his Paper "On the Construction of Harbour and Marine Works with Artificial Blocks of Large Size."

2. A Telford Medal, and a Telford Premium, to Richard Christopher Rapier, Assoc. Inst. C.E., for his Paper "On the Fixed Signals of Railways."

3. A Telford Medal and a Telford Premium, to Joseph Prestwich, F.R.S., Assoc. Inst. C.E., for his Paper "On the Geological Conditions affecting the Construction of a Tunnel between England and France."

4. A Watt Medal, and a Telford Premium, to Alexander Carnegie Kirk, Assoc. Inst. C.E., for his Paper "On the Mechanical Production of Cold."

5. A Watt Medal and a Telford Premium, to George Wightwick Rendel, M. Inst. C.E., for his Paper "On Gun Carriages and Mechanical Appliances for Working Heavy Ordnance."

6. The Manby Premium to Leveson Francis Vernon-Harcourt, M.A., M. Inst. C.E., for his "Account of the Construction and Maintenance of the Harbour at Braye Bay, Alderney."

7. A Telford Premium to Major James Browne, R.E., Assoc. Inst. C.E., for his Paper "On the Tracing and Construction of Roads in Mountainous Tropical Districts."

8. A Telford Premium to William Douglass, M. Inst. C.E., for his Paper "On the Great Basset Lighthouse, Ceylon."

9. A Telford Premium to Joseph McCarthy Meadows, for his Paper "On Peat Fuel Machinery."

The Council have likewise awarded the following Prizes to Students of the Institution:—

1. A Miller Prize to James Charles Inglis, Stud. Inst. C.E., for his Paper "On Theory and Practice in the Construction of Tanks."

2. A Miller Prize to Matthew Curry, jun., Stud. Inst. C.E., for his Paper "On the Lisbon Steam Tramway."

3. A Miller Prize to Walter Young Armstrong, Stud. Inst. C.E., for his Paper "On the Construction of, and the Means employed to place in Position, the Cylinders of a Bridge over the Wye, at Newport."

4. A Miller Prize to Charles Graham Smith, Stud. Inst. C.E., for his Paper "On Practical Ironwork."

5. A Miller Prize to Alfred Fyson, Stud. Inst. C.E., for his Paper "On Details in the Construction of Docks."

6. A Miller Prize to George Edward Page, Stud. Inst. C.E., for his Paper "On Coal Gas and its Manufacture."

#### NOTICE.

It has frequently occurred that in Papers which have been considered deserving of being read and published, and have even had Premiums awarded to them, the Authors may have advanced somewhat doubtful theories, or may have arrived at conclusions at variance with received opinions. The Council would, therefore emphatically repeat, that the Institution must not, as a body, be considered responsible for the facts and opinions advanced in the Papers or in the consequent Discussions; and it must be understood, that such Papers may have Medals and Premiums awarded to them, on account of the Science, Talent, or Industry, displayed in the consideration of the subject, and for the good which may be expected to result from the discussion and the inquiry; but that such notice, or award, must not be considered as any expression of opinion, on the part of the Institution, of the correctness of any of the views entertained by the Authors of the Papers.

THE ST. LOUIS BRIDGE, U.S.—The formal opening of this bridge has recently taken place. A local paper says:—"The completed bridge is of three spans of 497ft., 515ft., and 497ft. respectively in the clear, each span formed with four ribbed arches of cast steel. The double rib enables the arch to preserve its shape under all circumstances of unequal pressure on its parts, and obviates the necessity of a spandrel bracing. The spans rest on piers of granite and concrete, built on the bed rock of the river. The upper roadway is 50ft. wide between the railings, two foot-walks, each of 8ft., and a roadway of 34ft., occupying the space. Below the carriageway are the railway passages, each 13½ft. in the clear and 16ft. high, extending through arch openings of the same size in the piers and abutments. On

the other side of the river five stone arches 20ft. wide carry the railways over the levee and wharves; they are enclosed by a cut stone arcade of twenty arches supporting the upper roadway. Brick arches conduct the railways into the tunnel at Third-street, and along this, upon a 6ft. bed of macadamised stone, the trains will run to the Union depot. The carriageway runs on a level to Third-street. On the Illinois side the carriage road descends at once with a grade of 5ft. in 100ft., while the railway tracks curve off north and south over the approaches of trestle-work, with a descending grade of 1ft. in 100ft., till at a distance of 3,000ft. they reach the level of the Illinois roads. At its lowest point, in accordance with the requirements of the federal law, the bridge is 50ft. above high water mark. From the roadway it is at present between 90ft. and 100ft. from the surface of the river.

#### DEATH OF J. H. FOLEY, R.A.

THE death of John Henry Foley, the Royal Academician, took place at his residence, in Osnaburgh-street, on Thursday, the 27th ult., in his 56th year. The deceased sculptor was born in Dublin in 1818, and at 13 entered the drawing-school of the Royal Dublin Society. Having gained the first prizes in each of the classes he attended, for the "Study of the Human Form, Animals, Architecture, and Modelling," he migrated to London in the year 1834, and entered the Royal Academy for the purpose of studying sculpture. He first appeared before the public at the Exhibition in 1839, to which he contributed models of the "Death of Abel" and a figure of "Innocence." In the following year he produced "Ino and the Infant Bacchus." In 1842 he exhibited "The Houseless Wanderer." At the Westminster Hall competition, in 1844, Mr. Foley exhibited his "Ino and Infant Bacchus," and "A Youth at a Stream," having modelled the latter figure for the occasion, and was chosen one of the three sculptors to execute the statues for the New Palace at Westminster, receiving commissions for John Hampden (1847) and Selden (1853) in St. Stephen's Hall. He became an Associate of the Royal Academy in 1849, and in 1851 exhibited "The Mother." In 1856 he completed in bronze a group, "Lord Hardinge and Charger," for Calcutta, which was much admired. In 1858 he modelled "Caractacus" for the Mansion House, and in the same year was elected a Royal Academician. His diploma work from "Comus" soon followed. Among the more prominent of the portrait statues which have since issued from his studio are those of "Oliver Goldsmith" and "Edmund Burke," for the Dublin University; "Sir Charles Barry," for the New Palace at Westminster; "Lord Herbert of Lea," for the War Office; "Father Mathew," for Cork; "Sir Henry Marsh" and "Sir Dominic Corrigan," for Dublin; "Mr. Fielden, M.P.," for Todmorden; "Lord Elphinstone," for Bombay, and a Parsee dignitary for the same city. His most recent work is the colossal statue of the Prince Consort for the National Memorial in Hyde Park, and also the group "Asia," a composition of five figures, for the same work. Mr. Foley was a member of the Hibernian Academy, and in 1862 was chosen a member of the Belgian Academy. Of the works not enumerated above we may notice "Lear and Cordelia" and "The Death of Lear," 1841; "Venus rescuing Æneas," 1842; "Prospero relating his Adventures to Miranda," 1843; "Contemplation," 1845; "Innocence," 1841; "The Mourner," 1849; "Egeria," 1854 (commissioned by the Corporation of London, and now in the Mansion House). Mr. Foley was buried at Highgate Cemetery on Wednesday last. It was suggested by some of his intimate friends that St. Paul's Cathedral would be a fitting place for his sepulture; but his family have declined any ostentation, and their wishes were that the funeral ceremony should be conducted as privately as possible.

The *Bien Public* says that the King of Bavaria has commissioned two architects to prepare a plan of the Palace of Versailles, his purpose being to erect a similar building.

A new Primitive Methodist Chapel was opened on Wednesday week at Bramley, Yorks. It is built of stone, having carved capitals and a massive cornice in front. The interior is arranged after the fashion of an amphitheatre. The cost will be above £2,000.



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## OUR LITHOGRAPHIC ILLUSTRATIONS.

## DRYBURGH ABBEY.

THIS very interesting ruin is situated on the banks of the Tweed, about ten miles above Kelso and three miles below Melrose, and is dedicated to St. Mary. It is generally believed to have been founded by David the First, from his having alluded to the church of the brotherhood dedicated to St. Mary as founded by himself in a charter making large grants to the brothers then officiating. On the other hand, the Chronicle of Melrose states distinctly that Hugh de Morville, who died in 1162, was the founder. The monastery was founded, A.D. 1150, for brethren of the Premonstratensian order, who came from Alnwick; their superior held the rank of abbot. In the year 1322 the retreating army of Edward II. burnt it to the ground because there was not sufficient food for them. It was attacked on several occasions by English freebooters, and suffered in that inroad by Richard II. in the year 1544. An army of marauders, 700 strong, headed by Sir George Bowes and Sir Bryan Layton, burnt the town and abbey. By a charter of James VI. the domains of the abbey were converted into a temporal lordship in favour of the descendants of the Earl of Mar. Sir Walter Scott is buried under the vaulted chapel shown in this sketch. He, in a touching passage in his diary, describes how he deposited the remains of the thirty years' partner of his days beneath the turf on which he had so often sat with her in the sunshine in days of happiness and prosperity. Our engraving is a reproduction of a drawing by Mr. W. Rushworth, as exhibited at the Royal Academy this year.

## NEWNHAM HALL, CAMBRIDGE.

Our readers have recently heard a great deal about the revival of the "Queen Anne" style. One of the champions of this "revival" is Mr. Basil Champneys, and one of his works we illustrate this week. We have received no particulars of Newnham Hall, Cambridge, and consequently can give none.

## KINGSTONE CHURCH, DORSET.

Our double-page illustration represents the north-west view of Kingston Church, Dorset, as designed by Geo. Edmund Street, R.A., and as exhibited by him at the Royal Academy this summer. This being what has been called "the dead season" in London, we suppose that Mr. Street is out of it, as we have not received the usual courteous reply in answer to our request for a few lines of description to accompany the illustration.

## DESIGN FOR THE MIDDLE CLASS SCHOOL FOR THE GROCERS' COMPANY.

Five weeks since we offered some remarks on the competitive designs for the Middle Class School for the Grocers' Company. Though the authorities did all they could to prevent the public seeing the designs, they are absolutely helpless in preventing the public seeing the designs in print. We give one of them—that submitted by Mr. A. Bickerdike, of Cecil-street.

Middlesborough is growing rapidly; 1,000 new houses have been erected this year, and the population is now 44,000, or double what it was ten years ago.

The memorial-stone of a new town-hall and municipal offices at Rhyl is to be laid early next month. The architects are Messrs. Wood and Turner, of Barrow-in-Furness; and the contractor is Mr. J. R. Jones. The cost of the buildings will be about £6,000.

## CHANGES (PROSPECTIVE AND IDEAL) AT CHARING CROSS.

THE terms upon which Northumberland House has been acquired show that the mere unfurnished house of the ducal establishment in town was equivalent to £20,000 a year. Some appear to think the Metropolitan Board of Works rushed into the bargain with no definite conception of what they should do with it, and a plea has been raised for saving the house. Sir James Pennethorne planned a curved street that would have effected the same object, but Sir James was Crown Surveyor, and he gave one side of the new thoroughfare to the Crown land. The edifice, however, is in the hands of the auctioneer, and will soon be removed. The larger and more comprehensive question of public convenience, therefore, may now be proposed, and possibly lead to operations far beyond the limits at first intended; while if the opportunity now presented be allowed to escape, a barrier will be set up for generations to come. Among the desiderata is a bridge from Charing-cross to Lambeth. It would be of greater use than Waterloo and Westminster bridges together, and would properly start at the Strand level. Levels, in fact, at this advanced stage, in the formation of London, demand as much care as horizontal directions, and the *bigrade* is a recognised expedient. London Bridge is carried above Thames-street, Holborn spans Farringdon-street, and Hyde-park-corner will be relieved by the *bigrade*, or road of two levels. It separates the traffic of cross lines, and prevents the inconvenience of concentration. It suits a terraced arrangement of streets, than which nothing can be more effective on inclined sites. London presents few examples of terraced architecture, as the streets commonly rise and fall with the surface of the ground just as in the time of the Romans. Somerset House has survived recent changes around it, and with no sacrifice of utility or consequence, entirely through the well judged level of the court-yard and its terraced river front. The Adelphi is on a similar platform, and deserves effective treatment at the South. The park front of Carlton House terrace is the noblest street design in town. Nash was especially skilful in the broader qualities of composition and effect, though indifferent in details, and with less excuse than the great commander who had "a soul above buttons." The changes at Charing-cross need the scenic and pictorial elements that only our best architects know how to infuse, but it is hardly possible to conceive a finer opportunity for their display than must be found between the National Gallery and the granite brink of the Thames. There will of necessity be planted grounds and lofty edifices mingled with sculptured tributes to great memories; there will be the boulevard-like avenue to connect the Victoria Embankment with Trafalgar-square, with Nelson's Column—one of the few public ornaments that possess the quality of height in at all a commanding degree—for a focus. The roadway in front of this monument is nowhere surpassed for dangerous formation, nor would any remedy be so effectual as a terrace. All, indeed, gives scope and invitation to the hand of genius—the task being to combine the grace and charm of Nature with the conventionalism of Art, underlying the whole with a concealed but efficacious groundwork of Science.

It can hardly escape notice that railway accommodation here is far from adequate and satisfactory. Sooner or later some amendment must be made. The sooner, therefore, the better. The spur system, so well seen at Victoria, might be applied, and access given to the South-Western and other lines not as yet extended to this point. The uses, indeed, to which the sites of Northumberland House and Whitehall-yard might be devoted are numerous. Some may be of more pressing necessity, but the one desire of Crown and Town should be to take all fairly into account, and ultimately accomplish the utmost degree of public good.

T. M.

## INCREASED RAILWAY ACCOMMODATION FOR THE METROPOLIS.

IN connection with the present system of metropolitan railways, no fewer than eight new lines are, at a cost of over six millions sterling, now in course of construction. To the Alexandra Palace three fresh lines are being cut, viz.:—The Great Eastern Railway Company are constructing a new and direct line from their station at Bishopsgate; a new company is forming, at a cost of £16,000, a line from the Enfield Branch Junction of the Great Eastern line, a distance of four miles, direct into the Palace grounds; whilst a third company is engaged on a branch line,  $1\frac{1}{2}$  miles in length, from the Tottenham and Hampstead Junction Railway to the Edgware branch of the Great Northern Railway, and thence from Highgate Station to the Palace. The estimated cost of this enterprise is £320,000. The South-Eastern Company have at length found a means of access to the Crystal Palace by the construction of a new branch line, called the Crystal Palace and South Junction Railway, connecting the Greenwich line of the London, Chatham, and Dover Railway and their own system; this line, which is  $1\frac{1}{2}$  mile in length, will, when completed, cost £240,000.—Connecting Hammersmith and Acton, and at a cost of £480,000, a new line, two miles in length, linking together the Hammersmith Extension Railways and the North and South Western Railways at Acton, and having a common terminus in the Broadway, Hammersmith, will shortly be completed.—A junction line at Bow, in connection with the Blackwall Extension Railway, and a branch line from Hackney-Wick to the goods station at West Ham, are, in the hands of the Great Eastern Railway Company, being rapidly pushed forward.—At the London and North-Western Station at Euston, the Railway Clearing-house Committee have made large purchases of land and buildings for the purpose of extensively enlarging the present offices and departments under their control. In the enlargement of the passenger and goods stations at Waterloo, the London and South-Western Railway have conferred a boon on the metropolis by the purchase and demolition of a number of "rookeries" infested by the worst of characters; these have been pulled down, and in their places warehouses are rapidly rising. Between the north side of King's-cross Station and the Caledonian-road, the Great Northern Railway Company are making considerable alterations. All the present system is being expanded, and additional lines between St. Pancras and Islington are being laid. At the cost of £2,500,000, the Metropolitan Inner Circle Railway Company is engaged in carrying out its plans. In addition to the construction of lines, stations, &c., this company is compelled to make an entirely new street from Fenchurch-street to King William-street, and also to widen the streets right and left which branch therefrom. The importance attached to this enterprise may be gathered from the fact that the Metropolitan Board of Works and the Corporation of the City of London have subscribed the sums of £370,000 and £130,000 respectively.

The Rooms of the Royal Institute of British Architects will be closed from the 7th to the 21st of September. The first Ordinary General Meeting of the ensuing session will probably be held on Monday, the 2nd of November.

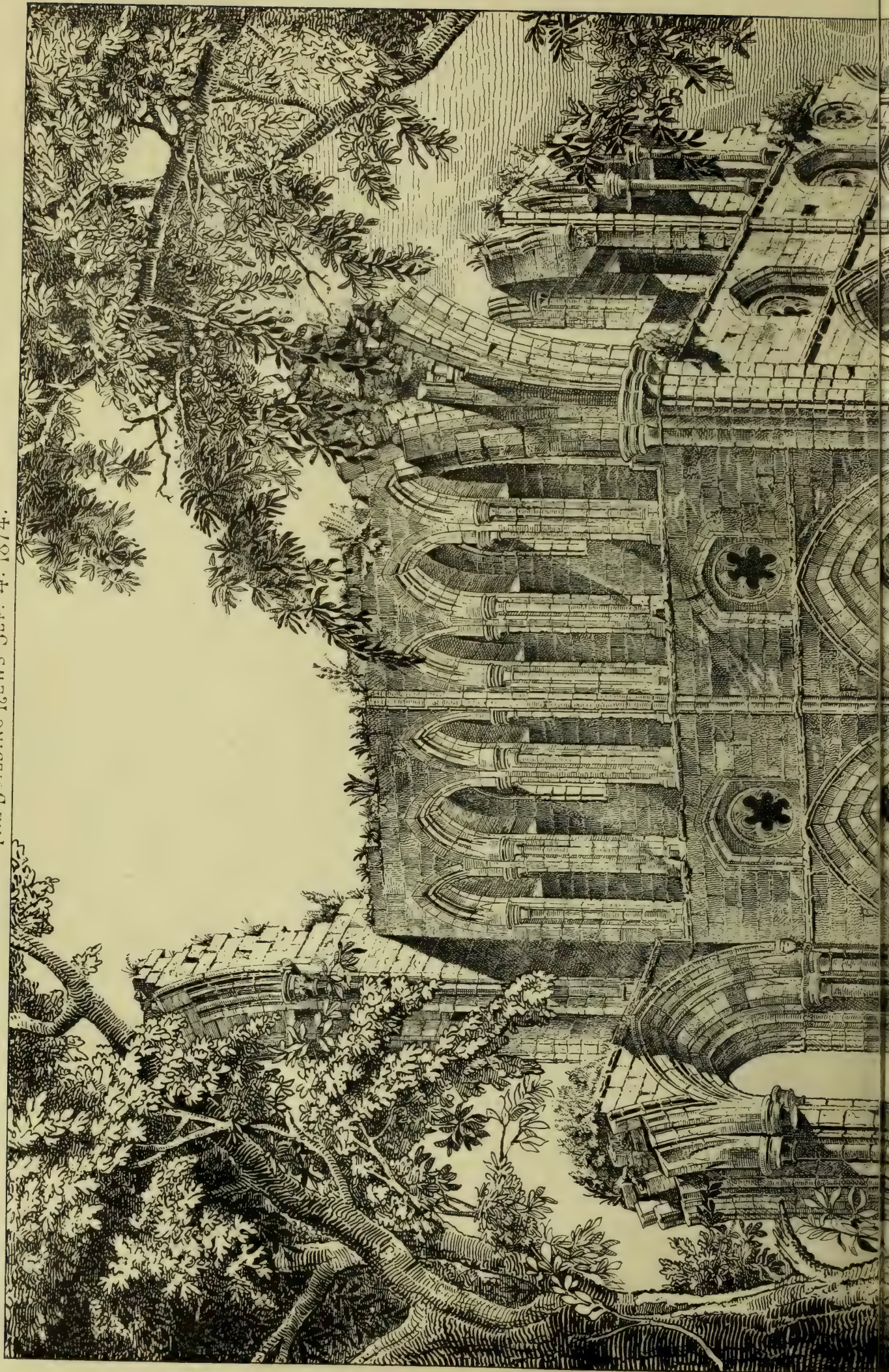
On Tuesday the foundation-stone of a new Primitive Methodist Chapel was laid at Goole. The building, which will be erected in the Italian style, will seat 800 persons. Mr. Freeman, of Hull, is the architect, and Mr. Gyles, of Goole, the contractor.

Several months since the New York Board of Apportionment placed 10,000 dollars at the disposal of the Board of Education to defray the expenses of determining upon an effective system of school ventilation. The Board of Education, after advertising for proposals, and holding several abortive public meetings, has let the matter drop with the excuse that a system of school ventilation would cost 100,000 dollars or more.

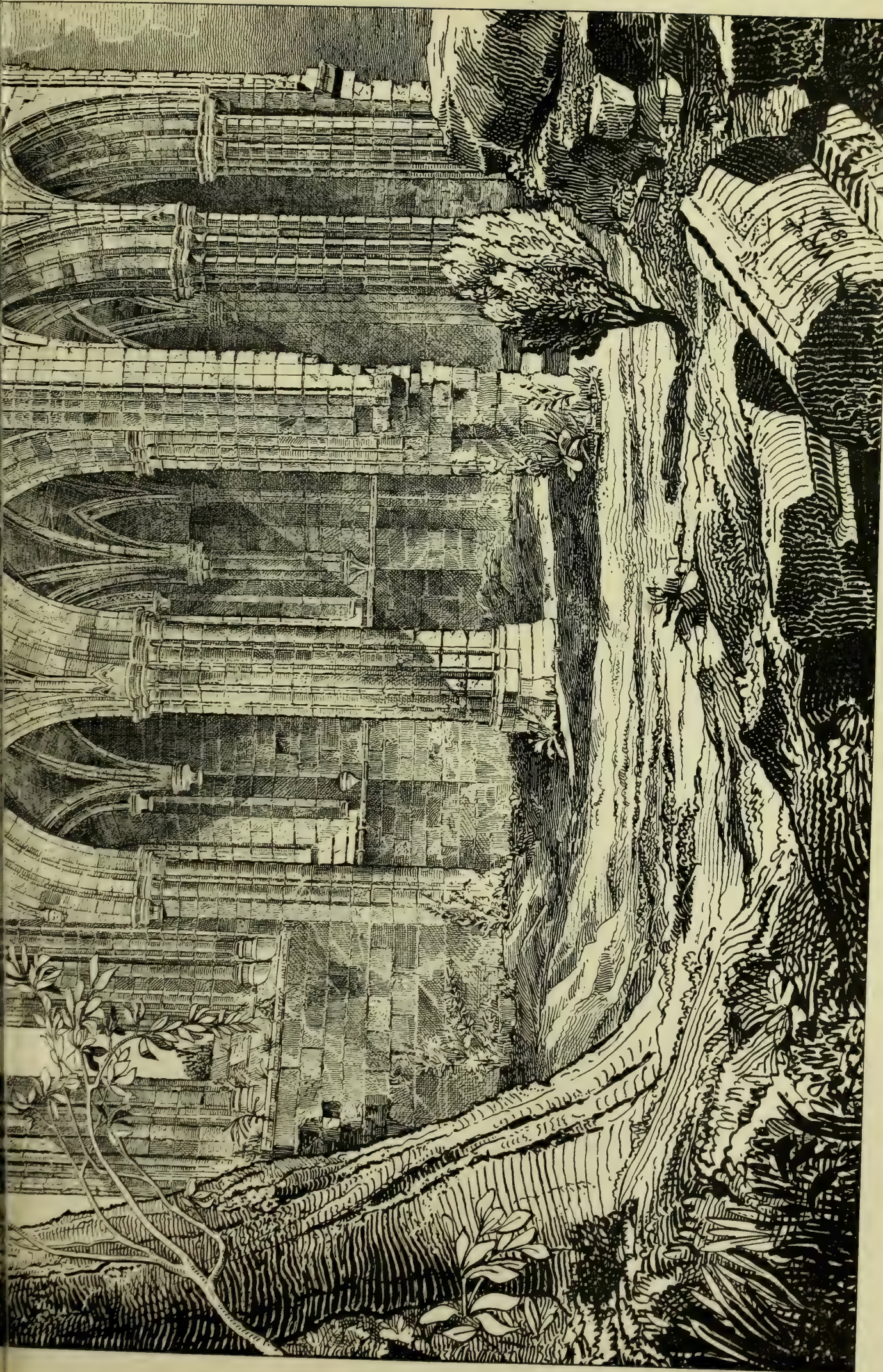












**DRYBURCH ABBEY.**  
DRAWN BY W. RUSHWORTH.

Photo Lithographed & Printed by James Akerman, St. George's Lane, Royal W. C.

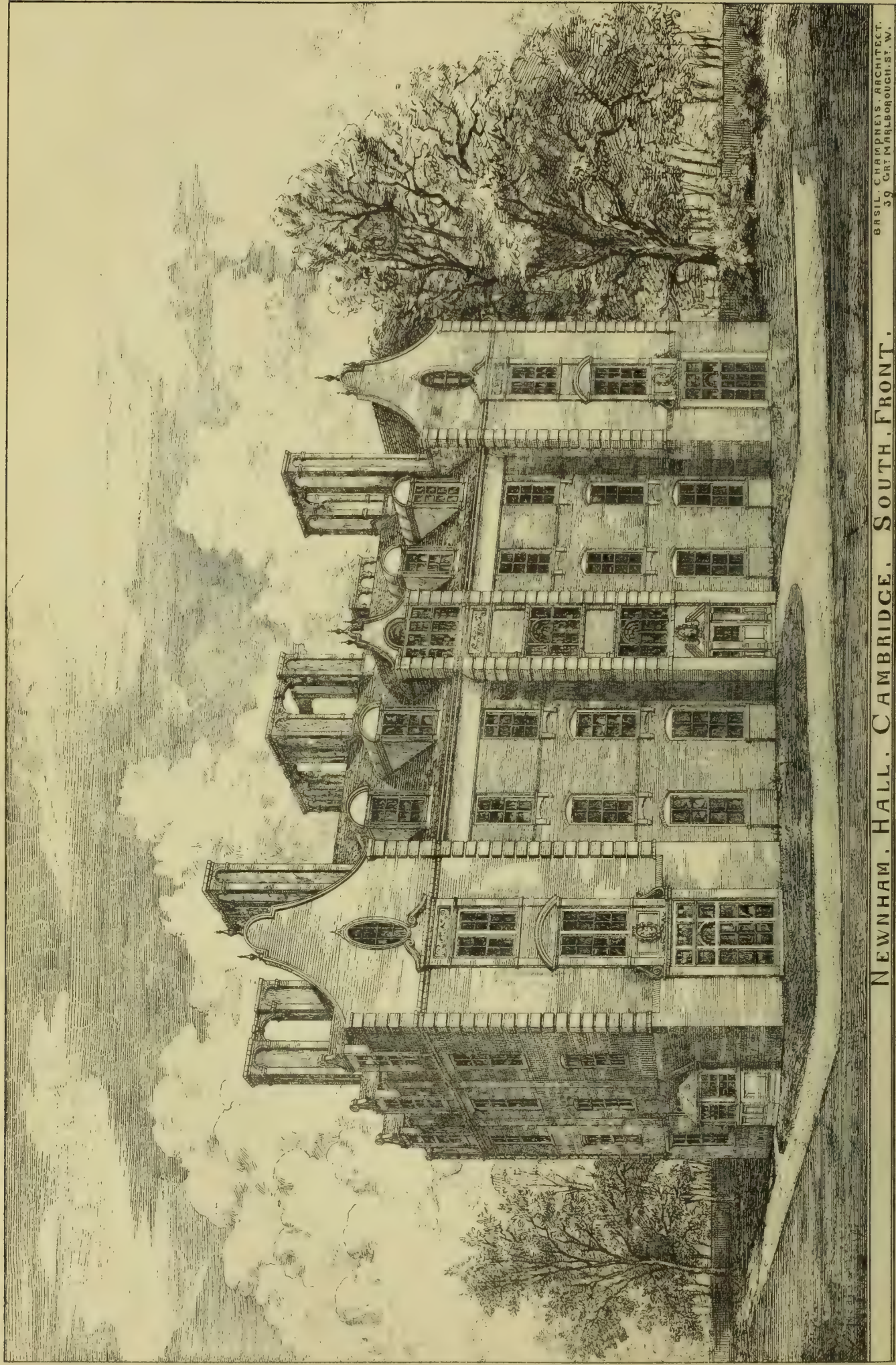












NEWNHAM. HALL. CAMBRIDGE. SOUTH. FRONT.

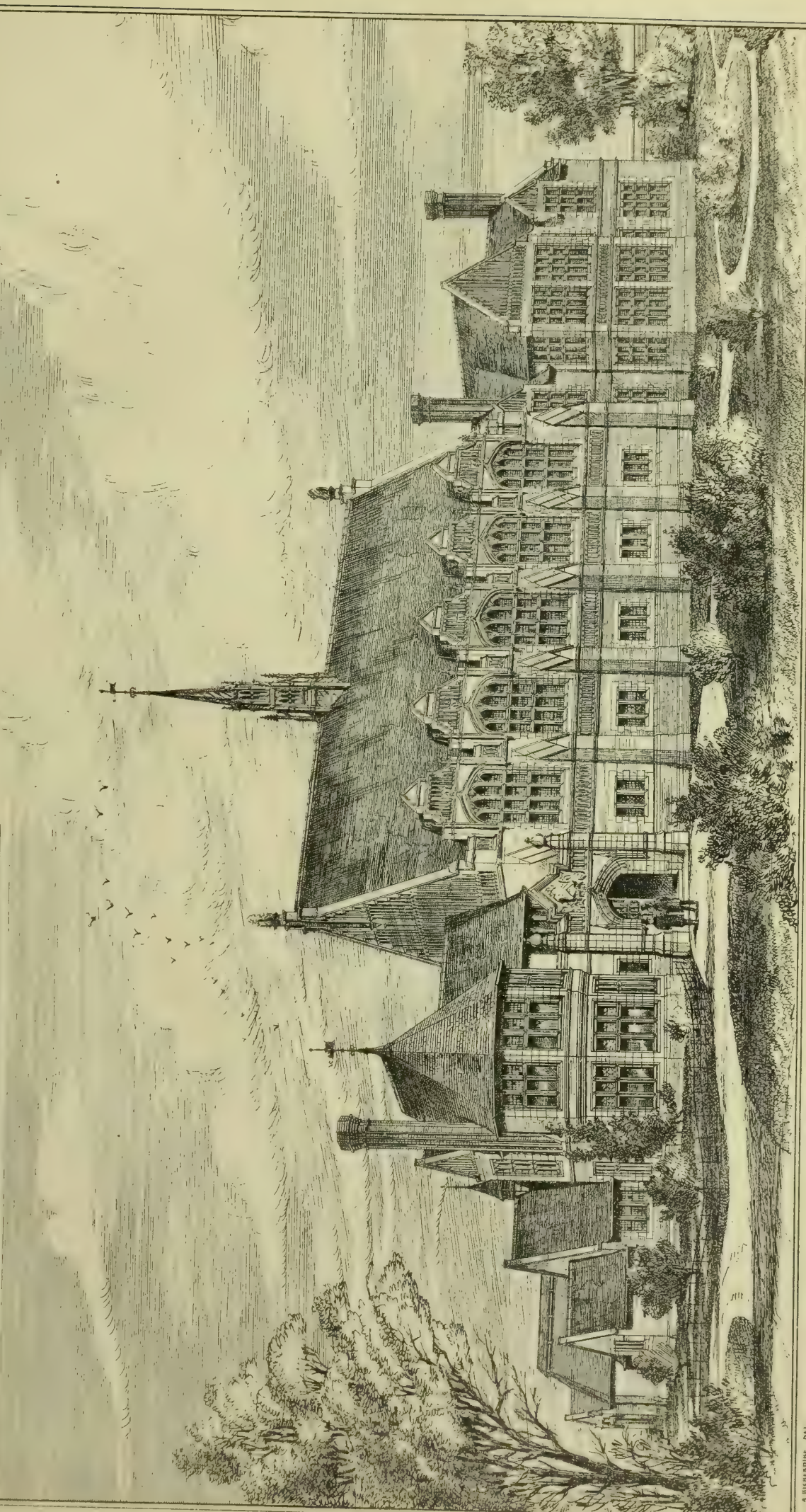
BASIL CHAMPNEYS, ARCHITECT.  
39 GREAT MARLBOROUGH ST. W.

Photo. Lithographed & Printed by James Alderman, 51, Gray's Inn Road, W.C.



THE BUILDING NEWS SEP. 4. 1874.

MIDDLE CLASS SCHOOLS FOR THE GROCERS COMPANY.  
DESIGN SUBMITTED BY ABICKERDIE ARCHITECT CECIL ST. W.C.



A. BUCKLAND DEL.

Photo. Engraved & United by James A. Brown & Sons, 100, New York.



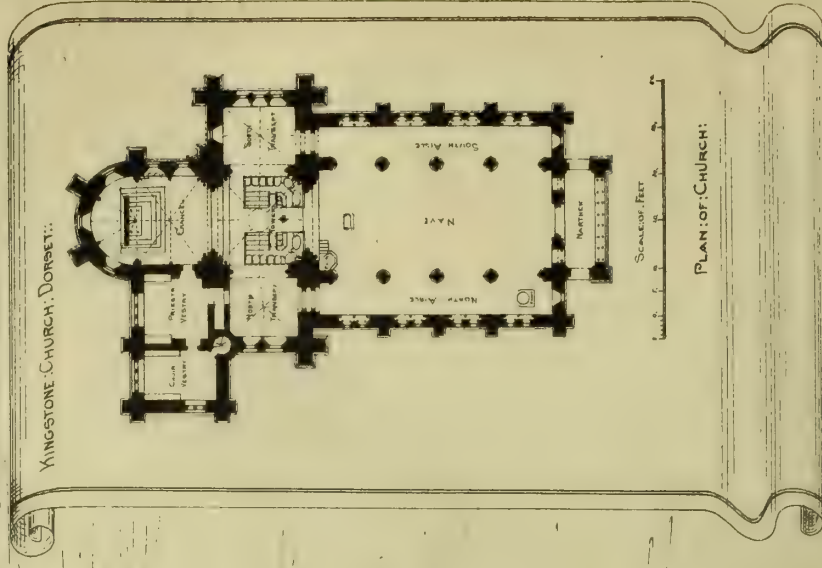
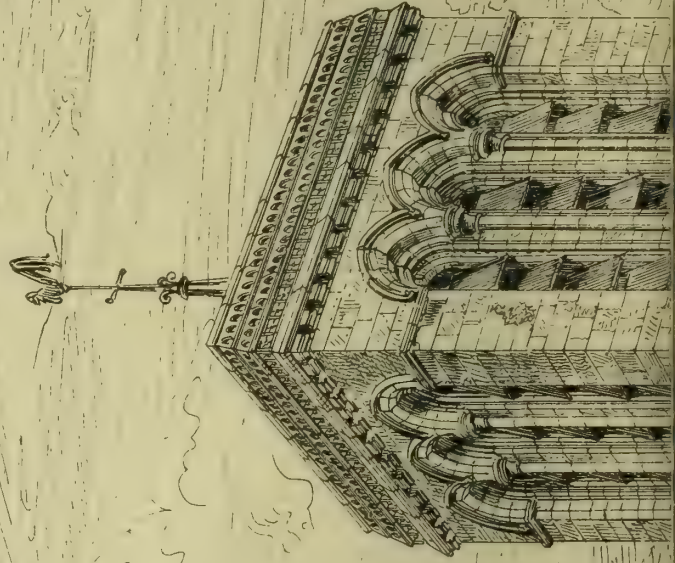




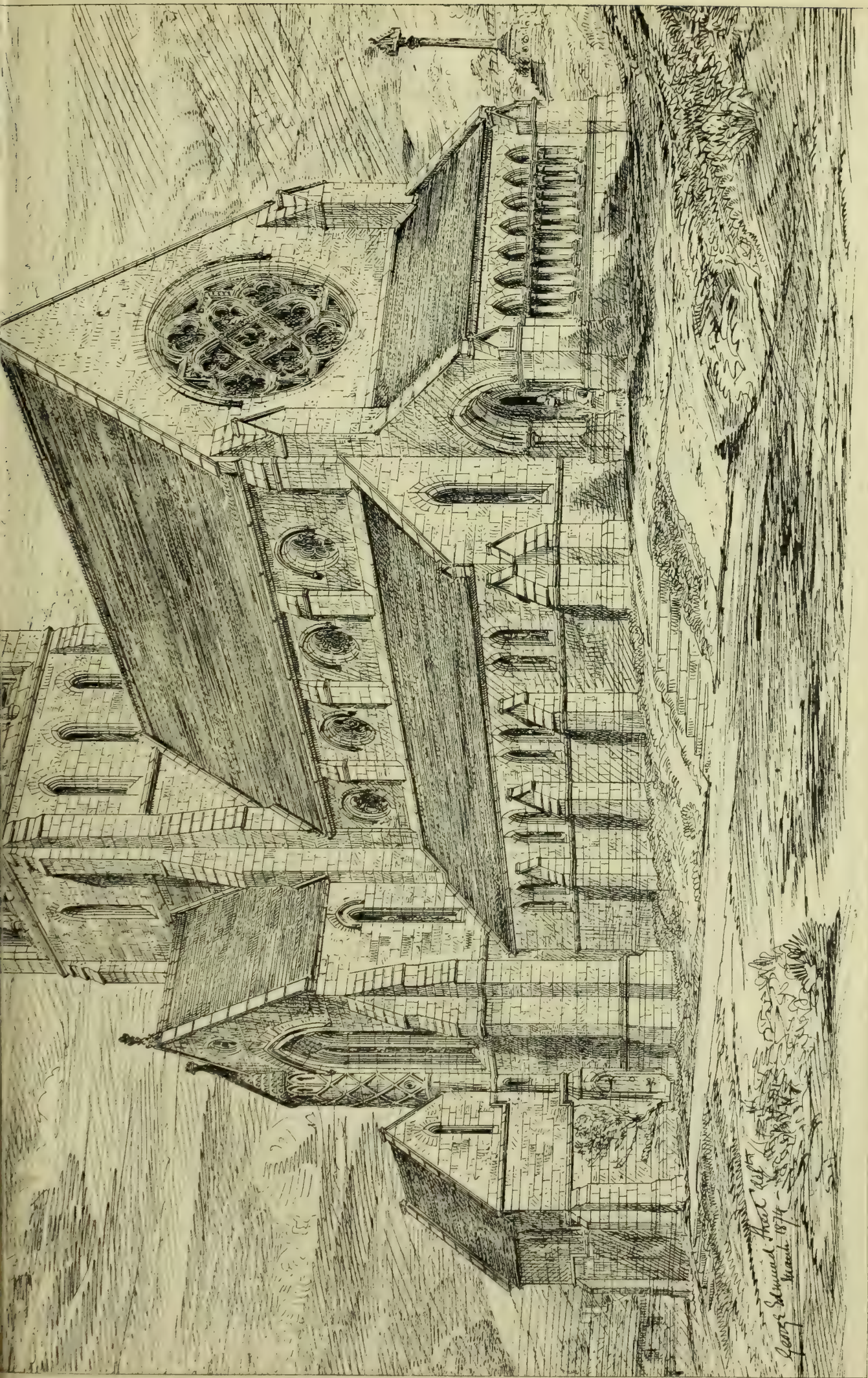




**KINGSTONE CHURCH DORSET, NORTH WEST VIEW.**  
**GEORGE EDMUND STREET R.A.**  
**ARCHITECT.**





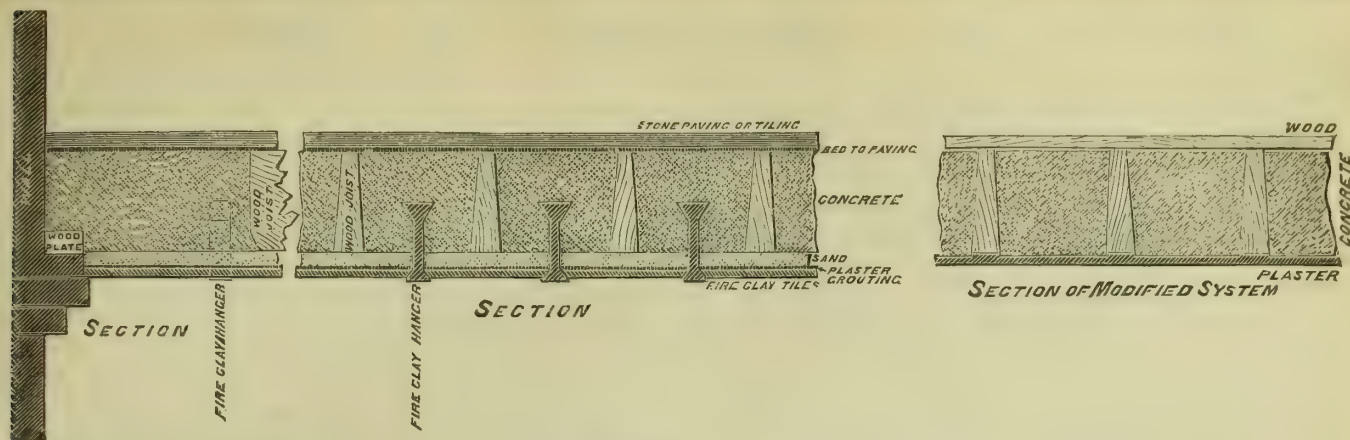


George Edmund Hart 1874  
March









# CAMBRIAN ARCHÆOLOGICAL ASSOCIATION.

ON Thursday week the members of this Association visited Hawarden Castle, the residence of Mr. Gladstone. They arrived at the park about twelve o'clock, and were conducted over the ruins of the old castle, which is kept in beautiful order. The walls that remain prove the fortress to have been of immense strength, and the walls of the tower are 15ft. thick. It was built by the Britons, and the first account of it is in the year 790, when Offa, King of Mercia, made his celebrated dyke as a boundary between his kingdom and that of Wales. The castle was for many centuries in the possession of the house of Stanley, until after the demise of James, Earl of Derby, who, being taken prisoner at the battle of Worcester, was beheaded, and the estate sequestered, in 1651. Mr. Gladstone's son (rector of Hawarden), in the absence of his father, entertained the members to luncheon. The company returned to Wrexham by way of Doldleston and Gresford.

At the evening meeting Sir Watkin W. Wynn, Bart., took the chair. Professor Babington gave a short description of the excursions on Wednesday to Chester, and that day to Hawarden Castle, and was followed by Mr. Bloxam, who stated that at Gresford he had found the remains of a Mediæval castle, but of which only the earthworks were now to be seen. He subsequently read a paper on the effigies of Wales, to which he had paid special attention.

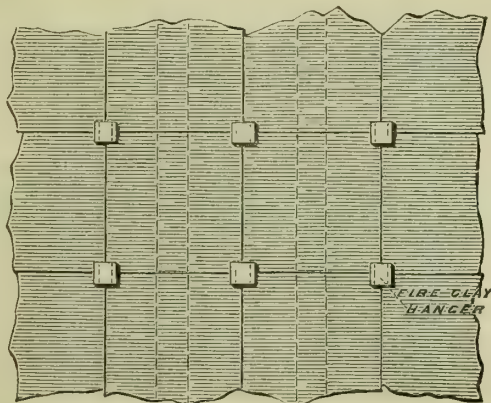
In the course of the evening a paper was read by Mr. Trevor Parkin, one of the local secretaries, on Offa's Dyke and Wat's Dyke, both of which are traceable for a considerable distance in the vicinity of Wrexham.—A discussion followed the reading of the paper, in the course of which Mr. Whalley made some characteristic and ridiculous remarks, accusing the generally-accepted theory of history so far as the Romans, Saxons, and Britons were concerned, of being untrue, and concocted to serve the interests of Roman Catholicism!

The week's proceedings were brought to a close on Friday. In the morning the members inspected Wrexham Church, which Mr. Bloxam pronounced perhaps the finest church in the Principality. The principal portion of the edifice, he stated, had been erected in the latter part of the fifteenth century, but he believed that the arches and pillars in the aisle had been erected much earlier. Alluding to the manner in which the old font (carried away during the Rebellion and used as a pig-trough and afterwards as a flower-pot) and the sedilia had been re-chiselled during the recent restoration, Mr. Bloxam condemned the practice of renovating ancient buildings, unless under the superintendence of a competent man. In the so-called restorations a vast deal of mischief was done, and large amounts of money needlessly expended. He also inspected an effigy said to be of Owain Glyndwr, the great Welsh chieftain, but he showed that that warrior had died about the time of Henry IV., whereas the effigy belonged to a period 100 years earlier. Subsequently, the members went in carriages to Bangor and Overton, and in the evening there was a conversazione in the public hall.

The Government of India have determined to perpetuate the memory of Dr. Stoliczka, the distinguished naturalist, who met his death on the return journey from Yarkand, by erecting a tomb over his remains at Leh, and a tablet in the New Indian Museum, Calcutta.

# PATENT FIREPROOF CONSTRUCTION FOR PUBLIC BUILDINGS, &c.

M. R. T. E. COLLCUTT, architect, 17, Essex-street, Strand, has patented an improved method of fireproof construction for public buildings, warehouses, and dwelling-houses. The admitted failure of the so-called fireproof constructions to prevent the spread of fires—not only from their inability to contain any substance whilst in a state of combustion, but their defects, both of material and design, causing them in many cases to become a source of positive danger, instead of protection—are sufficient to evoke an interest in any method that proposes to limit fire within the apartment or place in which it first arises. The problem that the inventor has set himself to solve is this: How to construct a fireproof floor that shall be light, so that its use shall not add materially to the cost of a building by reason of thicker walls; that it shall have no lateral thrust, so that expense of abutment to resist it will be unnecessary; and that it shall be constructed without metal, which, by its expansion when in a state of heat, pushes down the building it is designed to protect. The mode of construction, as explained by the wood-cuts, is as follows:—



Wooden joists of a slightly wedged shape, and resting upon wood plate in the ordinary manner, are first laid; a skeleton centring is then erected underneath, on which fireclay tiling is laid, with upright hangers clipping the angle of each tile; the whole of the joints are laid in plaster of Paris and lime, and a coating of the same is laid over them. A bed of fine-washed sand is then laid upon the whole surface up to the underside of the joists, upon which is put a filling-in of concrete up to the top of the joists, and above this a wood, or stone, or tile floor is laid in the ordinary manner. The concrete having set within the wedge-shaped joists, becomes a self-supporting and homogeneous mass, and, from the pressure of the particles, holds firmly the tile-hangers that carry the sand and fireclay tiles.

A modified carrying out of this system may be employed to ordinary dwelling-houses, by using the wedge-shaped joists, forming a rough centring underneath; and, the spaces between the joists being filled with concrete, the centring can be removed, and the underside plastered in the ordinary manner. When wood girders are necessary they should be encased with fireclay tiles and sand. Columns should be of terra-cotta, in beds, dowelled together at each bed. Iron columns, when necessary, should be

cased round with fireclay tiles, and the space between the iron and the fireclay filled in with sand.

A series of experiments, showing conclusively the capabilities of this invention, will be held as soon as arrangements can be made; and in the interim the inventor will be happy to explain the principle of his invention to any person interested in building.

# COMPETITIONS.

MARGATE BOROUGH DRAINAGE COMPETITION.—At the meeting of the Margate Town Council on Tuesday week, a letter from Sir Joseph Bazalgette was read, in which he replied to a number of questions which had been put to him by the Council. The general tenor was to the effect that none of the competitors had complied with all the requirements and conditions of the competition, several of them having provided no specifications, and others no detailed estimates. He also stated that he was unable to say which of the plans of internal drainage of the borough was most complete. Letters from several of the competitors were also read. "Economy" claimed that his plan was stated by the referee to come nearest to the requirements of the Council, and he protested against any supplementary scheme

being considered before the premiums in the competition were awarded. "C.E." asked that a supplementary plan he had sent before the reference was made to Sir Joseph Bazalgette might be opened and considered, as it would provide for the requirements of the Borough, as mentioned in Sir Joseph Bazalgette's report. (This is said to be the plan which was received and sealed up by the council without being inspected.) "Experientia" said Sir Joseph Bazalgette was in error in stating that he neglected to send in specifications. He then entered into an explanation of his plan, and submitted that it met, as far as practicable, the suggestions of the referee. He suggested that the plans admissible under Sir Joseph's report should be referred to a small sub-committee, and that the competitors should be invited to explain how the plans could be carried out. Mr. Bailey Denton stated

that had he known that Sir Joseph Bazalgette was to be the referee, he should not have competed, knowing that Sir Joseph was prejudiced against the system of drainage advocated by him (Mr. Denton). The Mayor said he thought Sir Joseph Bazalgette must be in error in saying that some of the competitors did not send in specifications and estimates, as he (the Mayor) remembered seeing some of them himself. He moved that the report should be received, and that Sir Joseph should be requested to return the plans, in order that the council might themselves inquire into the matter. After some discussion this motion was carried, and the consideration of the competitors' letters was adjourned. The Town-clerk read a letter from Mr. Albert Latham, the borough surveyor, asking permission to lay before the council a plan for the drainage of the borough, embodying the principles laid down by Sir Joseph Bazalgette, and adopting the tunnel plan of "Economy," together with such improvements as a long experience in the drainage of towns might suggest to him. He assured the council that no labour or pains on his part would be too great in order to provide an efficient system of drainage for the borough. The consideration of this letter was deferred until after the premiums in the competition had been awarded.



## ARCHÆOLOGICAL.

**BIRMINGHAM MIDLAND INSTITUTE.**—The last excursion for the present summer of the Archæological Section of the above Institute was made on Saturday last. Leaving Birmingham by the Midland Railway at one o'clock, for Coughton Station, the excursionists walked from the latter place to Bearley Station on the Stratford Railway, returning from thence by the train due in Birmingham at 9.35. The first place visited was Coughton Court, the residence of Sir William Throckmorton, Bart. The most interesting part of the Court is the gatehouse, which is a fine example of sixteenth-century domestic architecture. The neighbouring church is a late example of Perpendicular work, and is chiefly interesting on account of the valuable remains of fifteenth- and sixteenth-century painted glass in the windows, and for the monumental brasses on the tombs of the Throckmorton family. The church suffered early in the restoration fever, and its stonework in the interior has been painted to represent stonework. From Coughton, by a pleasant walk along the banks of the Avon, which was occasionally crossed and recrossed over picturesque bridges, the excursionists walked on to Aston Cantlow, where there is a very good thirteenth-century church. Its east window is a curious example of thirteenth-century work, being simply divided into three lights by mullions running straight up to the head. The north and south chancel windows are quite another type of the style, all of them having different tracery, of good design. The chancel has a good open timber wagon-headed roof, which perhaps is a little later in date, and which has been carefully preserved; and it has also bold and effective sedilia and piscina. In plan the church consists of west tower, nave, chancel, north aisle, and chantry chapel, the latter having probably been the chapel of the guild which is supposed to have been established here. The nave and aisle windows are fifteenth-century insertions, and the east window of the chantry chapel is a very good example of late fifteenth-century work. The upper stage of the tower is also of the fifteenth century. The church has been very carefully restored by Mr. Butterfield. The Guildhall is a picturesque, half-timbered house, prettily situated in a picturesque village. Some of the members afterwards visited the site of the Castle of the Cantilopes, from whom the village of Cantlow is said to have derived its name.

## CHIPS.

It is proposed to restore the parish-church of Haddenam, or Hadnam, in the Isle of Ely.

Mr. Silvanus Trevellick has been awarded the silver medal of the Royal Cornwall Polytechnic Institution for his design for schools at St. Columb and Padstow.

Odcombe Church is being restored, the contract having been taken by Mr. Charles Trask, of Norton-sub-Hamdon.

Extensive alterations are about to be made at the United Methodist Free Church, Booth Town, Halifax, Messrs. Leeming and Leeming, of Halifax, are the architects who have the work in hand.

A new Sea Side Home, which has cost about £3,500, was opened at Kilmun, N.B., on Saturday. It is intended as a convalescent residence for the sick poor of Glasgow and the surrounding neighbourhood.

A new lectern, carved in solid oak, has just been presented to the Church of St. Mary Elms, Ipswich. It was executed by Mr. Stopher, of the same town.

New Board Schools were opened at Long Backby, Northampton, on Tuesday week. Mr. Vernon is the architect. The school is a plain red brick building in the Gothic style.

Joseph Miller, builder and contractor, Leeds, has been committed for trial at the Keighley Petty Sessions for forgery.

Mottisfont Church, Hants, was reopened on Sunday week, after restoration.

The new screen in Winchester Cathedral, which has been designed by Sir Gilbert Scott, and is being erected as a joint memorial to Bishop Wilberforce and Dean Garnier, will be completed by the end of this month.

The various "Church Yachts" that cruise about the British Channel in all weathers frequently need "restoration." The Dockmaster of Penarth is appealing for £40 to restore the Church Yacht attached to that port, so that she may last five years longer.

The Palace of St. Germain is undergoing a complete restoration, rendered necessary by the deplorable condition in which it has been left during the last two centuries.

## Building Intelligence.

## CHURCHES AND CHAPELS.

**CLACTON-ON-SEA.**—A new-church is about to be erected at Clacton-on-Sea, a rising watering-place on the Essex coast. The church is designed to accommodate 350 persons, and will be built of concrete. Mr. G. Gard Pye, of Colchester, is the architect, and Messrs. Saunders and Son, of Dedham, the builders.

**CLEMENTHORPE.**—The church of St. Clement, Clementhorpe, York, was consecrated last week. Messrs. J. B. and W. Atkinson, of York, are the architects. The style is Early Gothic. The building is in length externally 107ft. 6in., by 57ft. in width, and will seat 567 worshippers. The height from the flooring to the apex of the roof is 52ft. The height of the north and south walls to the wall plates is 33ft. The materials used in the building of the church are principally dark red bricks, with black bands and stone dressings. The cost has been about £3,800.

**GREAT BENTLEY.**—The committee for the restoration of the parish-church of Great Bentley have just decided to carry out the plans submitted by Mr. Grimes, of Colchester, last February, for the entire restoration of the interior of the fabric, by clearing away the whole of the existing old-fashioned pews and western gallery, opening up the tower, and restoring the fine old west window, both the tower arch and west window having hitherto been blocked up. A new arch is to be introduced between the nave and chancel, in keeping with the early character of the church (Norman), and the building will be seated throughout with pitch-pine benches, varnished, while new pulpit, prayer-desk, lectern, and new communion-rails and standards are also to be added. The work was to be commenced this week.

**LEEDS.**—The foundation-stone of a new Wesleyan Chapel at Woodhouse Moor, Leeds, was laid on Friday last. The building will be Gothic in style, and will seat 1,100 people. Mr. C. O. Ellison, of Liverpool, is the architect. Under the chapel will be constructed a room capable of holding 700 people. There will be a tower with spire, 150ft. high. The new chapel is part of a scheme for extending Methodism in Leeds, which, when completed, will represent an outlay of nearly £50,000.

**NEATH.**—The parish-church of St. Thomas, Neath, Glamorganshire, was reopened on Thursday, August 27th, after restoration. The body of the church was rebuilt in the worst style of the last century, the tower alone remaining of the original structure. The pews and galleries have been removed, new boarded floors laid down, and open pitch-pine benches placed in the nave. The nave passages, chancel and tower, have been laid with tiles, by Mr. Godwin, of Lugwardine. New stone windows have been inserted in the aisles, and west tower window, which had been taken out from the transom upwards, has been replaced. The tower doorway has also been removed, and it is intended to proceed at once with a general restoration of the exterior of the tower, which is of characteristic Tudor work. The parapet, which had been rebuilt and raised to make room for a town clock, to the great injury of the design, will be restored as nearly as may be. The chancel has been cleared of its old fittings and pews, and furnished with choir-stalls in pitch-pine, with brass gas-standards, by Mr. Shrivell, of Castle-street. The nave roof has been stripped of its plastered ceiling, and boarded under the principals, according to the original design. The east and west windows have been filled with stained glass, by private donors. The architect is Mr. J. Bacon Fowler, of Swansea and London, and the work has been carried out by Mr. J. Thomas, of Neath, at a cost of about £1,300.

**SHEFFIELD.**—The shrine and canopy for the statue of Our Lady have been completed in the Roman Catholic Church of St. Mary, Sheffield. Messrs. Hadfield and Son are the architects. The shrine consists of two parts—the base and superstructure. The former is of alabaster, relieved with carving and gilding, which stands on a raised dais of polished fossil marble and encaustic tiles, charged with the fleur-de-lis. The top or offering table is a single slab, 6in. thick, of fossil marble, highly polished. This part of the work has at each side, in high relief, carved lilies, with gilded back-grounds; the upper part, with

its niche and towering canopy, rising to a height of 22ft., is constructed of wainscot oak, entirely gilded except where relieved with colour. In the centre is placed the image of Our Lady before alluded to, which is also of carved wood, by the late Herr Petts, of Munich. It represents Our Lady holding Our Lord in her arms. In the panels of the retable at each side are paintings, on gold ground, of the following saints:—St. John the Evangelist, St. Winefride, St. Dominic, and St. Katharine, the patroness of Sheffield. These paintings are the work of N. H. Westlake, Esq. The sculpture has been executed by Mr. Thomas Earp, the painting and decoration being the work of Messrs. Lavers, Barraud, and Westlake.

**WRITHLINGTON.**—A new church, dedicated to St. Mary Magdalene, was consecrated on Thursday week at Writhlington, near Radstock. The style is Late Decorated, and Messrs. C. and T. Brown, of Frome, are the builders, the cost being £1,800. The walls of the building are of local white lias stone, with Bath stone dressings, and at the west end there is a semi-tower built into the wall, on the top of which is a turret containing two bells. On the south side is a porch, the only public entrance to the church. In the interior the eastern wall is cased with Bath stone, in which are three quatrefoil panels with carved spandrels sunk to form a reredos.

## BUILDINGS.

**GLASGOW.**—The Kelvingrove Museum, Glasgow, is about to be enlarged, from plans by Mr. Carrick. The new building will consist of a large hall, 100ft. long by 40ft. wide, and will have galleries all round at the height of 14ft. from the floor. These galleries, which will be 12ft. under the roof, are to be 11ft. 6in. wide on each side, and at each end the width is to be increased to 15ft. This upper portion will be lighted from the roof, while, for the under portion, light will be obtained from seven windows on the south side, and four on the north side, in addition to light from the roof coming through the wall. At the west end of the large hall a room of one story in height, extending to 40ft. in length by 20ft. in breadth, is to be set apart as an aquarium. The style of the new wing will be Roman Doric.

**GLASGOW.**—A new Merchants' House is about to be erected at Glasgow, and the Bank of Scotland, which adjoins it, will, at the same time, be extended. The extensive block of buildings which will constitute the property of the Merchants' House, is intended to be three stories in height, with basement floor and attics. The style adopted in the present Bank of Scotland premises in St. Vincent-place will be maintained in the new buildings, the north-eastern corner being surmounted by a tower, rising in height to between 120 and 130ft., and the north-western by a tower of smaller dimensions. Mr. John Burnet is architect for the Merchants' House property, and Messrs. Campbell, Douglas, and Sellars for that of the bank of Scotland.

## SCHOOLS.

**ELLAND.**—Plans for a new Sunday-school and place of worship intended to be built by the United Methodist Free Church, Briggate, have been prepared by Mr. J. Bedford, of Elland. The cost is roughly estimated at from £1,000 to £1,500.

**GOVAN.**—The foundation-stone of a new school, in course of erection in connection with Abraham Hill's Trust, in the burgh of Govan, was laid on Friday last. The building fronts two streets, namely, John-street, along which it extends 105ft., and Langlands-road, along which it extends 75ft. The principal entrance door, in the centre of the elevation to John-street, is enriched with Doric columns and entablature, with a balcony above the cornice. Over this entrance a tower 16ft. square is in course of construction, which, when completed, will rise to a height of 70ft. above the pavement. The building is two stories in height—each 16ft. high clear—and comprises in all ten apartments. The building is in the Italian style. Mr. James Thomson, West Regent-street, Glasgow, is the architect.

**HUDDERSFIELD.**—On the 22nd ult. the corner-stones of new chapel-schools for the Methodist New Connexion were laid at Marsh, near Huddersfield. The building has been designed by Mr. S. Foster, of Lindley, and will accommodate 300 children on the ground-floor and 300 in the room on the first floor, which will also be used as a chapel. The cost will be about £1,800.



## TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

To OUR READERS.—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

## ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 9d. per line.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

## TERMS OF SUBSCRIPTIONS.

(Payable in advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom. To the United States £1. 6s. 6d. (or 6 dols. 40c. gold). To France or Belgium, £1. 6s. 6d. (or 32 francs 60 centimes). To India (via Southampton) £1. 16s. To any of the Australian Colonies, New Zealand, the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1. 6s. 6d.

N.B.—American and Belgian subscribers are requested to remit their subscriptions by International P. O. O., and to advise the publisher of the date and amount of their remittance. If the last-mentioned precaution is omitted, some difficulty is very likely to arise in obtaining the amount. Back numbers can only be sent at the rate of 7d. each, the postage charged being 3d. per copy. All foreign subscriptions unaccompanied by an additional remittance to cover the extra cost of forwarding back numbers are commenced from the next number published after the receipt of the subscription.

Cases for binding the half-yearly volumes, 2s. each.

Subscribers receiving their copies direct from the office are requested to observe that the last number of the term for which their Subscription is paid, will be forwarded to them in a coloured wrapper, as an intimation that a fresh remittance is necessary, if it be desired to continue the subscription.

RECEIVED.—E. and T. S.—W. B. T.—P. T.—F. G. H. S.—T. and R. B.—J. F. and Co.—W. G.—J. G. G.—W. H. A.—A. B.—J. W. D.—E. P. T.—J. W. G. and Co.—W. B. and Sons.—J. T. M.—J. F. T.—H. J. H.—J. B. and Sons.—E. J. H.—G. E. and Co.—A. B. N. B.—H. W. G.—C. and P.—E. O. B.—E. W. G.—J. R. B.—H. and H.

P. BOWMAN, Newsagent, Sauchiehall-street, Glasgow (As there is a very small loss on every copy of the BUILDING NEWS sold after a certain number, we do not, and cannot, undertake to send out copies on "sale or return.") —J. T. H. (If you want the "address of a competent landscape gardener who is able to advise as to the laying out of a pleasure ground, &c., to a proposed new mansion," why not advertise for him? At all events we cannot permit "Intercommunication," which is set apart for the mutual instruction of a section of our readers, to be occupied by such inquiries). —FRED. DRESSER (We suppose you must mean a book of designs prepared by Mr. Wilkinson, architect, Oxford. We do not know where the book was published. Mr. Wilkinson will no doubt on application supply you with the desired information). —PALEY & AUSTIN (The drawing to hand). —WM. LEIPER (The plan to hand). —T. T. SMITH (The drawing to hand). —ROBERT BRODIE MATHER (The sketch to hand). —A. D. M. (Declined). —JOHN KENNEDY (The drawing to hand). —W. V. M. (We do not undertake to recommend the best works on "hot water circulation," or any subject).

## Correspondence.

## PROPOSED TOWN HALL, HASTINGS.

(To the Editor of the BUILDING NEWS.)

SIR,—May be that I am wrong; still I cannot but help thinking that the old saying of "Cut your coat according to your cloth" is a proverb not very carefully studied by the committee when they drew out the conditions of this competition, for they have limited the amount of outlay to £10,000, whereas it is perfectly manifest that the accommodation they require will cost double that sum. By cubical calculation the buildings will amount, at the rate of 8d. per foot, to £24,000. The aforesaid sum of £10,000 will give 34d. per cubic foot. I believe several of the committees are practical men, and it is an astonishing thing how they could have made such an error. The result must be that either that accommodation will not be provided, or that the proposed outlay will have to be doubled—both alternatives very simple in their way, but very perplexing to the competitors. It is to be sincerely hoped that the final selection will be placed in the hands of those who have a better knowledge of the value of works.—I am, Sir, &c., W. P.

The Spa Hotel, Boscombe, Bournemouth, was opened on Monday last. The building has been erected at a cost of £11,000, from a design by Mr. R. W. Edis, F.S.A.

## Intercommunication.

## QUESTIONS.

[3442.]—Decimal Equivalents.—Can any reader give me information where I can procure a complete set of decimal equivalents for weights and measures of length, cubical and superficial, &c. s. d., and, in fact, all kinds of useful data; also where I can procure a good set of interest tables?—A SURVEYOR.

[3443.]—Strength of Rivets.—I want the mean tensile strain of rivets, iron, in tons, and the best form of riveting girder plates?—WROUGHT IRON.

[3444.]—Ventilation.—Can any of your correspondents give me the cubical air space allowed in prisons, hospitals, &c., and the allowance to be made for ordinary windows as regards supply of air?—INQUIRER.

[3445.]—Moment of Rupture.—I should feel much obliged if any one would tell me if there is a plan of finding the moment of rupture of a beam, loaded at any point?—STUDENT.

[3446.]—Surveying without Assistance.—Can any correspondent inform me how Viollet-le-Duc could possibly make an accurate survey of the French Alps, showing every footpath, stream, building, ravine, &c., without any assistance, as described in last week's BUILDING NEWS? I can quite understand the taking rough bearings of principal objects, but what about accurate measurements? Measured base lines are always required for calculating distances by angles, and to obtain accuracy in observations surveying poles are requisite to sight to with the theodolite. As it is necessary to move the latter instrument several times during the traversing of a stream, footpath, or other irregular line, poles would have to be resorted to. Apart from this, a land chain, and even tape, would become indispensable, and my experience is, that it is requisite for two persons to use a chain and range lines. No doubt if a system of surveying could be devised by which important surveys could be carried out by one individual, our eminent engineers, and nearer home, as affecting our own pockets, the Government Surveying Department, would find it, if adopted, to add greatly to their revenues, and, no doubt, prove a good wrinkle for Mr. Lowe in economising.—ANXIOUS INQUIRER.

## REPLIES.

[3421.]—Strength of Railway Bridges.—In reply to "G.," say span of bridge 100ft., depth of girder 10ft.; it is only the principle I want to understand, and not the strain for any particular bridge.—J. S.

[3426.]—Brown Stone.—In reply to "West of England," I should say Mansfield red would form a good contrast with Bath stone.—OLD STONE.

[3429.]—Duties of Land Steward.—Should be a practical land surveyor, i.e., know how to measure land of every description and make a plan thereof; in fact, to be enabled to measure a parish, if required, for a first-class map; to understand levelling; to value land and timber; to draw plans and specifications for farm buildings, and to estimate their cost. Also it is indispensably necessary he should understand farming, draining, and the general requirements of farms of different sizes and localities. The above is but an outline of what a "land steward" ought to understand.—G.

[3431.]—Bath Stone.—Perhaps your correspondent "H." will inform us what part of the coast he is using the stone, and of what description; further, if already fixed, we might give him some valuable information on the subject.—PICTOR & SONS, Bath Free-stone Works, Box, near Chippenham, Wilts, Aug. 29, 1874.

[3434.]—Smoky Chimneys.—"Inquirer's" case, though not common, is a difficult one. If he has not tried it, I advise him to contract the throat of his flue at the bottom. If this does not answer, probably one of the revolving caps at the top will. I have successfully treated several chimneys on the first plan.—ARCHITECT.

[3437.]—Railway Curves.—"G. P.'s" query is rather vague. The speed required or the greatest cant allowable should regulate the radius in all cases. If "G. P.," by his example of a 20ft. wheel-base means the radius for an arc just sufficient to allow that length of carriage to move along, the problem is, to find the least radius for that length of base. A practical way of getting it would be to find the angle made by a carriage to a straight line of the play between wheels and rail that could safely be adopted, and then three points could be determined and tangents drawn through them; the radius could then be found by the following formula:—Radius =  $T \div (\tan \frac{A}{2} + \tan \frac{B}{2})$  T being length of tangent, and A and B the acute angles formed at its extremities by the two other tangents. A radius of five chains is small for railways.—ENGINEER.

[3438.]—Lattice Girders.—The strains are found by laying off on a vertical the strains on end lattices from fixed load. Then join the end of this line with the centre of girder. The ordinates measured at any point will give the strain there.—GEOMETRICIAN.

[3438.]—Lattice Girders.—Strains.—"G. P." may determine the strains graphically or by formula. The former may be simply done thus:—Erect a vertical on the centre of beam and make it equal by scale to the strain there. Join the extremity of this line to the points of support, and the vertical ordinates will give the strains at any points. Or the strains may be found thus:—When load is distributed uniformly, multiply the span in feet by weight in lbs. on each girder, including its own weight, and divide by eight times the depth of the girder in feet. This will give the strains at centre of top and bottom booms or flanges. To find the strains at the supports the formula is  $W \times \cotan \alpha = \text{strain}$ , where W = weight on brace and  $\alpha = \text{angle of inclination of brace}$ . In practice it is safe to assume horizontal strain at end of first brace as equal to the vertical weight acting on the brace, which will be one-half whole weight on lattice girder. For the strain on any boom, in any bay, loaded either on top or bottom, divide the moment of rupture by the depth of the girder. The latter rule is for a girder with one system of vertical inclined bars. The upper flange or boom may be strained in compression to 4 tons per square inch, and the lower boom in tension to 5 tons, if of wrought iron.—ARCHITECT.

[3440.]—Specific Gravities and Strength of Stones.—The best list of specific gravities is that prepared by the late Mr. C. H. Smith for the "Mineral Statistics of Great Britain," the chief of which are given in Tarn's "Science of Building." The specific gravities of the Oolites are—Aubigny, 2,400; Ancaster, 2,229; Barnack, 2,188; Taynton, 2,175; Portland (Weycroft), 2,169; Portland (Roach), 2,028; Doulting, 2,147; Haydor, 2,135; Ketton, 2,045; Caen, 2,000; Bath (Box), 1,968; Bath (Coombe Down), 1866. The crushing strength of some of these stones is also given in the above-named work; that of Portland, from the Weycroft quarry, being 3,900lb. per square inch; of Ketton, 2,556; of Barnack, 1,775; of Haydor, 1,775; of Bath (Box), 1,490lb.; and of Ancaster, 2,345lb. per square inch. The power of absorbing water when saturated under the exhausted receiver of an air-pump, as given in the Report of the Commissioners on Stone for the Houses of Parliament, is as follows:—Portland absorbs '206 of its bulk; Box, '312; Ancaster, '180; Barnack, '204; Ketton, '244; Haydor, '241.—E. W. T.

## STAINED GLASS.

GLOUCESTER CATHEDRAL.—A memorial-window has just been placed in the cloisters of Gloucester Cathedral to the memory of the late Mr. R. Bransby Cooper, formerly M.P. for the city. The window is by Messrs. Hardman and Co., and the subjects are the conversion and martyrdom of St. Paul. Each of the two subjects occupies three of the six main lights; over are figures of angels, bearing the palm and crown of martyrdom; above is a figure of the saint ascending; and in the top tracery light the martyr's crown.

KING'S LYNN.—A new painted east window has been placed in the chancel of All Saints' Church, King's Lynn. The window is by Messrs. Hardman and Co., of Birmingham, and the subjects represented are the Crucifixion in the centre, and the Nativity and Baptism in the side lights. The figures are about half life-size. In the tracery above and in the base are figures of several major and minor prophets, and each subject is framed in tabernacle work, to harmonise with the window tracery and the reredos beneath.

## STATUES, MEMORIALS, &amp;c.

ECCLESFIELD.—A memorial has been erected in Ecclesfield Parish Church to the late Mrs. Alfred Gatty. It was designed by Mr. William White, F.S.A., and is contained in a panel of Forest of Dean stone, which rises to a point, and is edged with a line of dark reddish marble. In the recess are emblems executed in fine statuary marble—a triangle, a cross, palm branches, a crown, and a star—and the panel behind is diapered in gold. Below is the inscription in gilt lettering. The pedestal which supports the tablet is of Caen stone, and represents the upper portion of an angel, with outstretched wings and upraised hands. The work was executed by Mr. Faulkner, of Exeter.

EDINBURGH.—Mr. W. Brodie, R.S.A., has just completed a group of statuary intended as a memorial of the late George Grindlay, a benefactor to the Merchant Company's educational foundations. The design, which is executed in pure white marble, embraces three figures, the tallest standing 3ft. 9in. high. In the centre of the group Education is personified in a female of Classic mould. On one side stands a boy, with a book in his left hand and his right upon the scroll, while, on the other side, a little girl is seated with an open book upon her lap. The group is to be placed on a pedestal 3ft. 9in. high, among the other works of art which adorn the Merchant Hall.

FLORENCE.—A remarkable polychromatic monument has recently been raised in Florence to the memory of a young Indian prince who died in that town in 1870, on his way back from England to his native land. His body, according to his own desire, was burnt on the banks of the Arno, and this monument has been erected by his friends on the spot where the strange funeral rites were celebrated. The mausoleum is in the Oriental style, its chief feature being a coloured bust of the young prince. Charles Mant, Captain R.E., and an American sculptor, Mr. C. F. Fuller, are the artists.



GLASGOW.—A statue has been added to the pedestal which surmounts the facade of the Buchanan Institution, Glasgow. It has been designed by Mr. W. Brodie, R.S.A., and represents a boy, whose garments bespeak him one of the humble class which the foundation is intended to benefit, in a sitting posture, puzzling his brains over the slate, which bears some intricate arithmetical problem. At the boy's feet lie several tools. The design has been worked out in fine Redhall freestone.

LIVERPOOL.—A fountain which has been erected at the junction of Marybone and Standish-street, Liverpool, was opened on Saturday. The design consists of two sets of Cornish granite steps and a pedestal, and basin of polished red Peterhead granite, surmounted with a figure of Temperance in bronze metal, 4ft. 4in. in height, placed upon a Sicilian marble plinth. The jet of water flows from a carved water-lily. The total height of the fountain is 9ft. 6in. The fountain is a copy of the one erected in front of the Royal Exchange, London, and was designed and erected by the sculptors, W. and T. Willis, of Euston-road, London. The cost is about £300.

THE QUEEN'S STATUE AT ST. THOMAS'S HOSPITAL.—It is stated that the usual ceremony of unveiling this statue, which is Mr. Noble's latest work, will be dispensed with. Her Majesty, life-size, is represented in robes of state, seated in a state chair, with the sceptre in the right hand and orb in the left, the left arm resting upon an arm of the chair, the right brought forward and resting in the lap, the top of the sceptre being placed over the shoulder. Both feet are upon a footstool, the right forward and the left drawn back, and they are partially hidden by the falling drapery. The arms are bare. The statue, which is 5ft. in height, is now uncovered, and will be placed on a 4ft. pedestal under the fourth arch on the right-hand side of the grand entrance. The statue bears the following inscription:—"Her Majesty, Queen Victoria. The Gift of Sir John Musgrave, Bart., President, 1873."

#### WATER SUPPLY AND SANITARY MATTERS.

A WASTE-WATER METER.—Mr. Deacon, a Liverpool engineer, has, it is said, invented a machine called a waste-water meter, which will enable any water company to keep up a constant service. The objection to that scheme hitherto has been waste, which in Liverpool was so great that the town was compelled to abandon the constant-service system, after giving it a fair trial. Mr. Deacon's meter, as described in a paper read by Mr. F. J. Bramwell to the British Association, enables the inspectors, without entering the houses, to tell at once whether water has been set running, and the houses where this is found to be the case are next day visited by the officers of the company. The result is that an incessant inspection can be kept up without worrying people who use the water properly, and that constant service can be maintained with less waste than under the intermittent system. In Norwich it has been found that with supervision the waste from constant service is only half the waste from intermittent service; but supervision without Mr. Deacon's invention costs in a large city more than the companies can afford.

NORWICH.—At the last meeting of the Norwich Town Council reference was made to the serious defects which have been found to exist in the town sewerage works. One of the councillors, Mr. T. Jarrold, introduced the question by moving the rescinding of a resolution passed at the previous meeting of the Council by which certain portions of the low-level sewer were ordered to be lined with cast-iron tubing, in accordance with the joint report of Sir J. Hawkshaw and Mr. Bateman. Mr. Jarrold said (according to the report in the *Norfolk Chronicle*) that had it not been for the difference of opinion expressed by the eminent engineers who had been consulted on this question, he would not have consented to take the responsibility of making such a motion. He thought that, looking at the whole scheme, they might say, in the language of the present Prime Minister, that the sewer had been a matter of "plundering and blundering" from beginning to end. The 9in. brickwork was admitted to be a blunder, as was also the placing of it so low. Mr. Hawkesley had advised that the sewer be strutted, and this had been done, but an obstruction had been caused to the flow of the sewage. He also believed that there had been a great deal of bad work put into the sewer, so that they did not know what they could rely upon and what they could not. He concluded by moving the following resolution:—"Seeing that practical men on the committee and the eminent engineers are divided on the practicability of effectually patching-up the present low-level sewer, that a deputation of this Council seek an interview with the Secretary of the Local Government Board to ask the Department to send engineers, sappers, and miners to report upon it to this Council." The resolution was lost.

OXFORD MAIN DRAINAGE.—The Oxford Local Board, at their meeting on Wednesday last, have resolved to proceed with the construction of the outfall sewer and other works, from plans prepared by Mr. W. H. White, their engineer.

TRURO.—Dr. Blaxall, an Inspector from the Local Government Board, has just inspected various parts of this town, and finds a good deal of fault with the drainage. He recommends that the advice of a good engineer be taken as to a new outfall. He points out that the deaths from fever arising from bad water and bad drainage are much above the average, and suggests

that pan-closets should take the place of the present cesspits. As to the water supply, the well near Bosvigo is about 50ft. deep, and it is now intended to make drifts to get at the cross-course, and when this is reached it is believed that a plentiful supply of water will be forthcoming.

#### LAND AND BUILDING SOCIETIES.

COLCHESTER.—The fifth annual meeting of the Colchester Co-operative Mutual Permanent Benefit Building Society was held at the Culver-street Assembly-rooms on Monday week. A report was presented which showed that the board were enabled to place to the shareholders' account £6 per cent. interest during the past year, and, after paying all expenses, still leave a balance of £10. 8s. 8d. to be placed to the reserve fund.

THE NATIONAL FREEHOLD LAND SOCIETY.—The half-yearly meeting of the members of the above Society was held last week. The separate accounts for the quarters ended April 30th and July 30th were read by the secretary. The former showed deposits from members to the amount of £130,197. 10s. 1d., and the advances to members repaid were £16,454. 1s. 11d. The receipts from the British Land Company amounted to £24,476. 2s. 8d., and there had been repaid from other advances £47,019. 0d. 1d. The amount of deposits withdrawn during the quarter was £121,360. 8s. 9d., and the advances to members were £15,607. 8s. 10d. Other advances had been made to the extent of £66,211. 18s. For the quarter ended July 31st, the deposits from members reached £150,860, and the advances to members repaid £16,506. 16s. 5d. From the British Land Company there had been received during the three months £43,123. 13s. 5d., and other advances had been repaid to the amount of £4,028. 13s. 3d. The deposits withdrawn during the quarter reached £134,649. 0s. 7d.; the advances made to members £28,809. 13s. 2d., and £10,719. 9s. 3d. had been received from the British Land Company. The amount of other advances was £25,003. 4s. 11d. The rate of interest on the deposits at the end of each quarter was at the rate of 4 per cent.

#### LEGAL INTELLIGENCE.

DANGEROUS WOODEN STRUCTURES.—Mr. Wigmore, builder, of Fulham, was summoned, on Friday last, at the Hammersmith Police Court, at the instance of Mr. Moseley, for erecting a building without notice, and not inclosing it with incombustible materials. Mr. Claydon, who defended, submitted that it was not a building within the meaning of the Act. It was a temporary erection without sides to it, and used as a covering for carts. Mr. Ingham thought the defendant ought to go to the Metropolitan Board of Works for their sanction to it. He should certainly hold that it was a building. He fined the defendant 1s. and 2s. costs for not giving notice, and adjourned the other summons to give him an opportunity to apply to the Metropolitan Board, who would sanction the structure if there was not any danger.—Mr. Serff, a builder, of Fulham, was also summoned with respect to a carpenter's shop in Star-lane. The defendant said it was a temporary building. Mr. Ingham said that some of these things commenced with being temporary and ended with being permanent. He fined the defendant 1s. and 2s. costs, for not giving notice, and ordered him to pull the building down, or inclose it with incombustible materials within the space of one month.

#### CHIPS.

The last stone of the Vendome Column was laid on Monday afternoon. The statue of Napoleon will not be ready for erection until the end of this month.

St. David's Church, Exeter, is about to be re-erected.

The Municipal Council of Paris, while adopting the scheme for a new cemetery at Méry, resolved to offer a prize for the best system of cremation.

The Gloucester Corn Exchange is to be enlarged, and the erection of a new Town Hall is at present under discussion.

The Swiss papers announce the completion of the piercing of the Parade's Tunnel, near Lugano, on the line of the St. Gothard Railway. The tunnel is 725 metres in length, and may soon be opened for traffic.

An effort is to be made at the next meeting of the Liverpool Town Council to place the supply of gas to the town in the hands of the Corporation, as is the case in Manchester and some other towns.

A new public market was opened at Harrogate on Saturday.

The foundation-stone of a new Convalescent and Seaside Home for Orphans was laid on Saturday at Margate. Messrs. Drew and Bower are the architects.

To induce artisans and others to visit the Exhibition for the purpose of gaining technical instruction, the charge for admission has been reduced to threepence each person on Mondays, Tuesdays, and Saturdays, being the free days at the South Kensington Museum. The Exhibition will close on the 31st of October.

#### Our Office Table.

A CITY BUILT BY ONE MAN.—Mr. A. T. Stewart, one of the most wealthy merchants in the United States, has conceived the unique idea of building a model suburban city near New York, where comfortable homes, provided with all modern improvements, may be obtained for a moderate outlay. He purchased a plot of land, ten thousand acres in extent, and embracing that portion of Long Island known as Hempstead Plains. This is a compact tract of about ten miles in length by one mile in width, and nearly a perfect parallelogram in shape. Surveying and staking out the new city followed close upon the acquisition of the ground, and the first work taken in hand was the making of streets and avenues, with pavements, sewers, culverts and conduits, for blocks of buildings yet to be erected. Simultaneous with laying the foundations of the houses was the commencement of gas and waterworks, and of a railroad connecting the city with New York. Unlike the usual course adopted in projecting new towns in the vicinity of the metropolis, no lots were advertised, nor has any attempt been made to dispose of the property, as it is the intention to treat the city as a single house, finishing it first, and selling it subsequently. An hotel, together with some forty houses, are thus far complete. The latter are located in lots of 200ft. by 200ft. and provided with outhouses and handsomely laid-out grounds. They rent for from 250dols. to 800dols. per year on three-years leases. Work upon this town, to which the name of Garden City has been given, is rapidly progressing, and the advantages offered are said to be meeting with a wide popular appreciation.

MR. NEWMAN HALL'S LINCOLN TOWER.—It is known that the new chapel in course of erection for Mr. Newman Hall's congregation is to have a lofty tower, which is to be known by the name of the Lincoln Tower, in honour of Mr. Lincoln. The *Penn Monthly* has a word or two to say on the said tower. On the occasion of laying the foundation-stone of the chapel a short time since, it was announced, among other things, that the lofty top was to be adorned with a colossal American eagle in loving proximity to an enormous British lion. "We may venture to hope," says the *Penn Monthly*, "that this is not true. It is very well and proper that the architectural design should express the meaning of the structure, and one can readily imagine how appropriately the tower might be topped by a gigantic lion lying down with a prodigious lamb; but the eagle will perhaps appear insignificant beside the king of beasts, and have a zoological-garden-kind of look, and the combination seems hardly one which even the uncultivated and somewhat grotesque imagination of the unfortunate Mr. Lincoln, who so helplessly contributes a name to the tower, would have contemplated with delight."

STRAW A PROTECTION AGAINST LIGHTNING.—An extraordinary account has appeared in a French agricultural journal, to the effect that straw forms admirable lightning conductors. It had been observed that straw had the property of discharging Leyden jars without spark or explosion, and some one in the neighbourhood of Tarbes had the idea of constructing straw lightning conductors, which were formed by fastening a wisp of rope of straw to a deal stick by means of brass wire, and capping the conductor with a copper point. It is asserted that the experiment has been tried on a large scale around Tarbes, eighteen communes having been provided with such straw conductors, only one being erected for every sixty arpents, or 750 acres, and that the whole neighbourhood has thus been preserved from the effects, not only of lightning, but of hail also. The statement comes from a respectable source, and the apparatus being extremely simple and inexpensive, it is at any rate worth a trial. Copper conductors are out of the question in ninety-nine cases out of a hundred, but every cottager almost could set up a straw one.

THE SOCIETY FOR THE PROMOTION OF SCIENTIFIC INDUSTRY.—The Society for the Promotion of Scientific Industry announces another exhibition of labour-saving appliances, to be opened about six months hence. This year's exhibition was the first held by the Society, and the arrangements for it had to be made somewhat hastily. Nevertheless, the success which it obtained was considerable. Next year's exhibition is to be on a greatly increased scale. The building



will cover something like four times the area of that erected this Spring in Peel Park, Manchester. The exhibition will consist of two main divisions, the one for "engineers' and mechanics' tools and appliances in the working of metals, wood, and stone"; the other for "domestic appliances." These last will include machinery for "the saving of fuel" (to which last year's exhibition was specially devoted), "the improved preparation of food, and the increased healthiness of the home."

**MORPHOLOGY IN ARCHITECTURE.**—At one of the recent sittings of the Academy of Fine Arts in Paris, M. Hugo, member of the Mathematical Society founded at Paris since the war, presented to the Section of Architecture a morphological theory, which he considers as fundamental. This theory undertakes, according to him, to show mathematically the connection between the polygonal figures which are so frequently employed in monumental constructions. These figures are derived from the pyramid, and, according as the solids in question are more or less massive than the pyramid, they are divided into domoids and tremoids. If we increase the number of faces, we arrive at the solid of revolution just as we pass from the prism to the cylinder. The new and very remarkable figure which generates the sphere has received the name of equi-domoid. The celebrated cupola of Brunelleschi, which crowns the dome of Florence, is an equi-domoid. M. Hugo thinks that the theory of the sphere has no independent existence, and that it is the simple geometric corollary of the equi-domoid. The passage from the pyramids of Euclid's geometry and of the Egyptian architecture to the spheres of modern geometry and the domes of modern architecture, M. Hugo calls the morphology of architecture.

**MANCHESTER CITY IMPROVEMENTS.**—The Manchester Town Council will appear in next session of Parliament to promote a very comprehensive bill for the purpose of carrying out very important local improvements. Powers will be sought to consolidate and equalise the properties, liabilities, and rating powers of the several townships, in accordance with a resolution of the Council adopted some months ago; to extend the area of the waterworks; to continue the widening of Deansgate from Bridge-street to Knot-Mill; to improve the river Medlock; and for other purposes. The proposal to go to Parliament obtained a formal sanction at the meeting of the General Purposes Committee on Thursday week.

**ACTION OF SLAG ON FIRECLAY.**—The results of an experimental inquiry into the behaviour of different fireclays when in contact with iron blast-furnace slag at high temperatures has been published in *Dingler's Polytech. Journal*, CCIII., p. 445-450, by Carl Bischof. The experiments, says the *Iron and Steel Institute*, were made by mixing the fireclays with the desired proportion of powdered slag, and moulding it into a small cylinder which is exposed to the heat until it loses shape. With Hessian fireclay, one per cent. of slag is sufficient when the temperature is as high as the fusing point of platinum. Gruenstadt, Muelheim, and Belgian fireclays required from 5 to 7 per cent.; Laaren No. 2 fireclay, 6 per cent.; Garnkirk, 8 per cent.; Laaren No. 1, 13 per cent.; and Zellitz fireclay, 14 per cent. Of course, these results are merely comparative, since blast-furnace slags vary greatly in chemical composition; and in trials made with two different slags, one produced along with grey Bessemer pig iron which contained 54 per cent. of lime, and the other from white iron, with 41 per cent. of lime; the latter exhibited less tendency to make the fireclay fusible.

**A THEATRICAL IMPROVEMENT.**—A correspondent says:—The manager of the Théâtre de la Monnaie (the great Opera), Brussels, is trying a new means to prevent the disturbance occasioned by frequent entries into the house during the performance, which are caused here chiefly by visits of the spectators during the entr'actes to the numerous cafés and taverns in the neighbourhood. The outside of the theatre has now been provided with electric bells all round, by which the absentees will always be informed in future three minutes before the rising of the curtain that the time has arrived to return.

**NEW ACT ON REAL PROPERTY.**—Among the Acts of Parliament passed during the late session was one of some importance relating to actions and suits as to real property. After it takes effect, on January 1st, 1879, no proceeding is to be taken to recover any land or real property

but within twelve years after the right accrued. A mortgagor is to be barred twelve years after the mortgagee took possession.

#### CHIPS.

In the 25 years from 1849 to 1873 there have been 262,563 new houses built in the metropolitan police district, and 6,578 new streets and 71 squares formed. The length of these new streets and squares exceeds 1,158 miles.

A new "Bodega," or Spanish wine store, has just been built in Bucklersbury, from the designs and under the superintendence of Mr. Robert Walker and Mr. W. C. Stonor, the contractor being Mr. Andrew Kilby.

On Saturday the foundation-stone was laid of a new porch to Swanscombe Church, near Dartford. The trowel used on the occasion was that used by King Charles II. in laying the foundation-stone of St. Paul's Cathedral in 1675, and it bears an inscription recording the fact, and stating that it was presented to the Lodge of Antiquity by Brother Sir Christopher Wren, Worshipful Master of the Lodge.

Many of our readers will regret to hear of the death of Mr. John Crowden, of the firm of Crowden and Garrod, of Falcon-square. Mr. Crowden's partner, Mr. Garrod, only died in June last. The business will be continued under the old style by Mr. Crowden's sons.

Ransome's Patent Stone Company has just gone into liquidation. Messrs. Delotte, Dever, Griffiths, and Co., of Lothbury, are the liquidators.

A Committee has been formed for the purpose of presenting a testimonial to Mr. John Gibson, the originator of that style of garden embellishment which is called "sub-tropical" gardening, and for which Battersea Park, while under his superintendence, was famed. Mr. Gibson has been for some months past suffering from a severe attack of paralysis.

Chelmorton Church, near Buxton, Derbyshire, is in course of restoration.

The parish-church at Welwyn, Herts, is about to be considerably enlarged.

In ten years the cost of cleaning the streets of New York has increased from 13,500 dollars to 1,000,000 dollars.

The Metropolitan Board of Works have incurred an expenditure of £36,504. 17s. 2d. in promoting the Metropolitan Buildings and Management Bill. The Bill having been withdrawn, all this expenditure has been for nought.

A new line of tramway is being laid down from the Horns at Kennington to St. George's Church in the Borough, and thence along Dover-road to the Bricklayers' Arms, Old Kent-road. The works will be completed by November.

The erection of the new Peabody Museum in New Haven, Conn., has been commenced. The building will consist of a central edifice and two wings. For the present, only one of the latter is to be erected, with a frontage of 115ft. on one street and 100ft. on another. It will cost 160,000 dollars, be built of brick, with stone dressings, and contain, including basement, four available stories.

Jarrah timber, the valuable product of Western Australia, is said to be growing in appreciation in the neighbouring Australian colonies, and also in New Zealand. The Western Australian Timber Company recently received an order for as many as 100,000 railway sleepers. Further supplies for New Zealand are also being arranged for.

### CHUBB'S STRONG ROOMS,

IRON LININGS, Iron Doors and Safes;  
IRON LININGS, SHUTTING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB AND SON,  
Makers to the Bank of England,  
57, S. Paul's Church-yard, E.C. } London.  
And 68, S. James' street, S.W. [ADVT.]

### Trade News.

#### WAGES MOVEMENT.

**KIRKCALDY.**—On Saturday a meeting of the United Operative Masons of Kirkcaldy was held, to consider the question of weekly wages and apprenticeships. Delegates had been appointed to wait upon the various masters in town, asking them to pay their men weekly, but the whole of them had refused to comply with the request, with the exception of Messrs. James Miln and Son. It was agreed to again wait on the masters on Monday, and if they still refuse to grant weekly pays and have their apprentices bound, that the operatives give in their notices to leave work.

**THE NORTH WALES SLATE TRADE.**—On Tuesday morning, by his request, a deputation of men on strike at the Penrhyn quarries had an interview with Mr. Pennant Lloyd, Lord Penrhyn's chief agent, but the result has not transpired. Tuesday was the monthly letting day, and it is understood that only two men took new bargains.

### The Timber Trade.

**THE CLYDE QUEBEC FLEET.**—The timber importers and measurers of Greenock are endeavouring to make up for the time lost through the blocking of the harbours while the Court of Session action for interdict by the Clyde Trustees against the Harbour Trust, as to erecting timber ponds at Finlaystone, was pending, and during the past week, since the decision favourable to the latter body was given, the work of discharge has been proceeding briskly. No fewer than 36 Quebec-trading ships were on Saturday last at Greenock, and 11 at Port-Glasgow, while 19 have been despatched on their second voyage. The whole number of arrivals in the Clyde from Quebec this season was 66.

The wholesale prices for timber, deals, &c., are as under:—

Staves per mille of pipe.		£. s.	£. s.
Memel crown		125 0	150 0
" 1st brack		105 0	120 0
New York, dbl. ex. & heavy per m.		37 0	
" heavy hoghead		32 0	
Per cubic fathom.			
Petersburg lathwood		10 0	11 0
Dantzlg		8 0	
Riga, &c.		8 0	9 0
Per 120 12ft. 1½ × 11in.			
Sandvik, 1 & 2 yellow	3 by 9	15 10	
" 3rd	3 by 9	14 10	
" 4th	3 by 9	13 10	
Ljusne, 1 & 2	boards	13 0	
" 3rd	3 by 9	15 0	
Hernefors, 1 & 2	3 by 9	15 10	
"	3 by 8	14 10	
" 3rd	3 by 9	14 10	
"	3 by 8	14 0	
Gefle, 1st & 2nd	2½ by 9	16 10	
"	2 by 9	16 0	
"	2½ by 7	15 5	15 10
" 3rd	3 by 9	15 10	
"	4 by 9	15 0	
"	4 by 12	15 0	
" 4th	3 by 9	14 0	14 5
"	3 by 11	13 10	
"	2½ by 7	13 10	
Petersburg 1st	3 by 9	16 10	
"	2½ by 7	14 0	
" 1st white	3 by 11	12 10	
"	3 by 7	12 0	
"	boards	11 10	
" 2nd	3 by 11	12 0	
Kingsgarden, 3rd yellow	3 by 9	15 0	
" 4th	3 by 7	13 0	
Alfredsham 1 & 2	3 by 9	16 10	
" 4th	3 by 7	13 0	
Sundswall, 1 & 2	4 by 9	14 10	
" 3rd	3 by 9	14 0	
" 4th	3 by 9	13 10	
Soderham, 1 & 2	3 by 10	15 10	
" 3rd	3 by 10	14 10	
"	3 by 8	14 0	
" 4th	3 by 10	13 10	
"	boards	12 0	
" 1 & 2 white	3 by 9	12 0	
"	3 by 7	11 0	
Swartwick 3rd yellow	4 by 9	15 0	
"	3 by 11	15 0	
"	2 by 9	14 15	15 0
Bjorneborg, 1 & 2 yellow	3 by 9	14 0	
"	3 by 7	13 0	
Nedir Callx, 1 & 2	3 by 9	15 0	
" 3rd	3 by 9	14 0	
Gothenburg, 3rd	3 by 7	13 10	13 15
"	3 by 11	14 10	
"	3 by 8	13 10	
Stockaviken, 1 & 2	3 by 9	15 10	15 15
" 3rd	2½ by 9	14 10	
"	2 by 8	14 0	
" 4th	2 by 8	12 15	13 0
Quebec, 1st bright pine	wide	24 10	24 15
" 3rd	12ft. 3 by 11	13 10	
" 1st dry floated	wide	23 10	
Summas, 3rd yellow	3 by 9	15 10	
"	4 by 9	14 10	
"	2½ by 7	13 10	14 0
Kotka, 1 & 2	3 by 10	12 10	
"	3 by 7	12 0	
"	boards	12 0	
Hudikswall, 2nd yellow	3 by 11	13 0	
" 3rd	2½ by 10	15 10	
"	2½ by 9	14 0	
" 1 & 2 white	3 by 9	12 0	
Stockholm, 3rd yellow		13 10	12 15
" 4th		12 10	
Narva, 3rd	3 by 11	12 0	
Kramfors, 1 & 2	3 by 10	14 10	
"	3 by 8	13 10	
" 3rd	3 by 9	14 10	
Per 120 12ft. 2½ × by 6½.			
Dram, 2nd yellow	2½ by 6½	11 0	
Porsgrund, 2nd yellow	2½ by 6½	12 0	
" 3rd	2½ by 6½	11 10	
Dram, 3rd white	2½ by 6½	10 0	
Christiana, 3rd white	2½ by 6½	10 0	
Per 120 12ft. 3 × 3.			
Gaspe spruce		16 10	18 0
Quebec, 1st spruce	3in.	20 0	
"	2in.	18 0	19 0



Quebec 2nd ..	3in.	£	s.	£	s.
" 3rd ..	3in.	17	15	17	10
St. John's unsorted do.	3 in.	18	0		
Sannesund, 2nd white	3 by 9	17	10		
" "	3 by 7	11	0		

Per load of 50 cubic feet.

Sundswall fir :	.	.	s. d.	s. d.
Pitch pine ..	.	.	60	0
Quebec elm ..	.	.	80	0
	.	.	105	0
	.	.	125	0

The prices of square timber remain unaltered, and there is little business being done. The business in flooring boards is dull, and prices are about the same.

## WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay.—For samples and further particulars, apply to the MANAGER, at the Quarries Narberth-road, R.S.O.—[ADVT.]

## TENDERS.

**BERMONDSEY.**—For alterations to premises, Leather Market, for Messrs. Hepburn and Sons. Mr. J. Gale, architect.

Laschelles ..	£897	0	0
Colls and Sons ..	890	0	0
Tarrant ..	884	0	0

**BISHOPS STORTFORD.**—For schools, house, offices and boundary walls, Thorley. Mr. George Perry, architect, Bishops Stortford. Quantities supplied by Mr. E. Carpenter, Reading.

Groome ..	£1,314	0	0
Cornwell ..	1,280	0	0
Dickinson ..	1,255	0	0
Horn ..	1,200	0	0
Glasscock ..	1,190	0	0

**CLACTON-ON-SEA, ESSEX.**—For the erection of a new church at Clacton-on-Sea, Essex. Mr. G. Gard Pye, architect, Colchester.

Clark and Son ..	£995	0	0
Luff ..	972	0	0
Dobson ..	955	0	0
Snelling ..	924	0	0
Saunders and Son (accepted) ..	883	0	0

**COLCHESTER.**—For the erection of St. Nicholas Church, Colchester.

Dobson (accepted) ..	£10,800	0	0
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**DESFORD, NEAR LEICESTER.**—For villa residence and entrance lodges, for Mr. Wm. Thompson. Mr. Jas. Frank Smith, architect. Quantities supplied.

Ratcliff ..	£6,638	0	0
Eagle ..	5,780	0	0
H. Bland ..	5,725	0	0
Duxbury ..	5,659	0	0
T. Bland (accepted) ..	6,050	0	0

**EXETER.**—For the erection of a lecture hall at the Congregational Church, Southernhay, Exeter. Messrs. John Tarring and Son, architects, 69, Basinghall-street, London, E.C.

Tozer ..	£1,184	16	0
Luscombe ..	1,047	0	0
Smith ..	1,035	0	0
Scadding ..	939	0	0

**GUNNERSBURY.**—For the erection of a villa residence for Mr. J. Chapman. Mr. E. F. Roberts, A.R.I.B.A., architect.

Temple and Foster ..	£2,069	0	0
Scrivenor and White ..	1,950	0	0
Chamberlin Bros. ..	1,899	0	0
William Downs ..	1,887	0	0
Adamson and Son ..	1,885	0	0
Aitchison and Walker ..	1,755	0	0

**KENT.**—For Congregational Mission Church, New Eltham. Mr. Ranger, architect.

Haisman ..	£727	0	0
Deacon ..	647	0	0
Booker (accepted) ..	550	0	0

**LEICESTER.**—For shop in the market place, for Mr. Jonathan Brown. Mr. Jas. Frank Smith, architect. Quantities supplied.

Duxbury ..	£2,050	0	0
Kellett ..	2,015	0	0
Neale and Son ..	1,899	0	0
Herbert ..	1,769	0	0
Chambers ..	1,735	0	0
Osborne Bros. ..	1,680	0	0
Hewitt and Son (accepted) ..	1,650	0	0

Separate Tender for Ironwork.

Gimson and Co. ..	203	14	0
Richards and Co. (accepted) ..	194	0	0

**LEICESTER.**—For warehouse, shed, chimney-shaft, engine and boiler-house, for Mr. W. F. Hutchinson. Mr. Jas. Frank Smith, architect. Quantities supplied.

Duxbury ..	£2,750	0	0
Neale and Son ..	2,525	0	0
Gilbert and Pipes ..	2,249	0	0
Osborne Bros. ..	2,194	0	0
T. Bland ..	2,150	0	0
Ratcliff ..	1,975	0	0
H. Bland (accepted) ..	1,968	0	0

**LIVERPOOL.**—For the erection of the Walker Art Gallery.

Tomkinson and Son ..	£20,145	0	0
Lealie ..	19,521	0	0
Jones and Sons ..	19,130	0	0
Urmson ..	19,027	0	0
Rome ..	19,000	0	0
Mullin ..	19,000	0	0
Wells and Sons ..	18,600	0	0
W. and F. Witter ..	18,590	0	0
Purroughs and Sons ..	18,556	0	0
Thornton ..	18,540	0	0
Holme and Nicol ..	18,284	0	0
Gabbutt ..	18,150	0	0
Haigh and Co. (accepted) ..	17,849	0	0

**LONDON.**—For alterations and additions to the offices of Reuter's Telegram Company, Old Jewry. Mr. H. H. Collins, architect.

Vernall ..	£1,675	0	0
Oliver ..	1,625	0	0
Minchia ..	1,150	0	0
Moreland and Nixon ..	970	0	0

**MILL HILL.**—For the erection of two cottages for Mr. J. Smith. Mr. T. E. Collett, architect.

Winyard ..	£950	0	0
Plozman ..	770	0	0
Donne ..	713	0	0

**NORTHAMPTONSHIRE.**—For alterations and additions to Wesleyan Chapel, Higham Ferrers. Mr. Ranger, architect.

Hall (accepted) ..	£900	0	0
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**SOUTHAMPTON.**—For laying new pumping main for the Borough of Southampton.

Sanders ..	£1,890	0	0
Aird and Sons ..	2,000	0	0
Reid Bros. ..	2,800	0	0
Cole ..	2,286	0	0
Hull and Sons ..	2,347	0	3
Bugbird ..	2,090	14	6
Willcocks (accepted) ..	1,760	0	0

**YORKS.**—For new Wesleyan Chapel, Langtoft, near Driffield. Mr. Ranger, architect.

Mainprize (accepted) ..	£820	0	0
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## BATH AND OTHER BUILDING STONES OF BEST QUALITY

**RANDELL, SAUNDERS & CO., Limited.** Quarrymen and Stone Merchants.

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PORTLAND STONE COMPANY (LIMITED), ISLE OF PORTLAND, DORSET.

London Depots at South Western and Great Western Railways.

## COMPETITIONS OPEN.

**ARLESEY, BEDFORDSHIRE, Sept. 30.**—For plans for Board schools and master's residence. T. J. Hooper, Clerk to the School Board, County Court Office, Biggleswade.

**CARDIFF, Sept. 29.**—For designs for the proposed Free Library, Museum, and Science and Art Schools. Mr. E. Payne, Hon. Sec., The Wharf, Cardiff.

**HASTINGS, Sept. 24.**—For designs for a new Town Hall, with police offices, lock-ups, public offices, &c. Premiums of £100, £50, and £25 will be given for the three most approved designs. Mr. G. Meadows, Town Clerk, 8, Bank-buildings, Hastings.

**Geometrical and Encaustic Tile Pavements** in every variety. Over Sixty New Designs at 5s. 6d. per yard super. "The Tiles are excellent, both in quality and colour."—BUILDING NEWS. "They are of great excellence in design—the material is not surpassed by any found in this kingdom."—Art Journal. "The patterns are remarkably good and effective."—Gardener's Magazine, &c. Designs and sample Tiles free on application to HENRY C. WEBB, Tiles, Worcester. London House, 114, Victoria-street, Westminster. Mr. T. Pulling, Agent.—[ADVT.]

## CONTRACTS OPEN FOR BUILDING

### ESTIMATES.

**ALCESTER RAILWAY, Sept. 18.**—For the supply of iron rails, fish-plates, fang-bolts, fish-bolts and nuts, and crescented Baltic red wood sleepers. Mr. W. Clarke, C.E., 45, Parliament-street, Westminster, S.W.

**BAINBRIDGE, Sept. 12.**—For the erection of a school, outbuildings, and boundary walls. Mr. J. Kay, architect, 12, Corn Exchange, Leeds.

**BIGGLESWADE SCHOOL BOARD, Sept. 14.**—For the erection of boys', girls', and infants' schools. T. J. Hooper, Clerk to the Board, Biggleswade, Beds.

**BATLEY, Sept. 14.**—For the erection of covered sheds, stables, cottages, &c. at Carlinghow. Messrs. Sheard and Hanstock, architects, Batley.

**BLAIND, Sept. 7.**—For the erection of a police station. Mr. W. P. James, architect, Cardiff.

**BOARD OF WORKS, STRAND DISTRICT, Sept. 9.**—For the removal of all soil, slush, and other refuse. T. M. Jenkins, Clerk to the Board, 5, Tavistock-street, W.C.

**BOLTON, Sept. 22.**—For the erection of a high level roadway between Deansgate and St. George's-road. Mr. J. Proctor, Town Hall, Bolton.

**CALEDONIAN RAILWAY CO., Sept. 14.**—For the supply of bricks, clay, lime, glass, gas and water fittings, and other stores. Mr. W. Haig, Superintendent of Stores, Caledonian Railway, St. Rollox, Glasgow.

**GREENWICH UNION, Sept. 17.**—For the erection of new male and female vagrant wards at the workhouse. Messrs. Franklin and Andrews, 5, Adelaide-place, London-bridge.

**GREAT WESTERN RAILWAY, Oct. 5.**—For driving about 750 yards of 6ft. heading at Portskewet, Engineer's Office, Paddington Station.

**HARRINGTON, Sept. 7.**—For the erection of schools. Mr. T. L. Banks, architect, 103, Scotch-street, Whitehaven.

**HEADINGLEY, Sept. 10.**—For the erection of nine houses in Victoria-road. Mr. Wilks, architect, 9, East Parade, Leeds.

**HIGH WYCOMBE, Sept. 10.**—For supplying engines and pumps, engine and boiler-house, reservoir and mains. Mr. J. W. Wilson, Engineer, South Tower, Crystal Palace.

**HORFIELD, Sept. 8.**—For the erection of a boundary wall on the site of the new prison. Messrs. Brice and Burgess, City Solicitors, Council House, Bristol.

**HOVE, SUSSEX, Sept. 10.**—For providing and laying about 500 yards of asphalt paving. O. A. Woolley, District Clerk, Town Hall, Hove.

**LEEDS, Sept. 7.**—For alterations to premises in George-street. W. H. Harris, architect, 2, Infirmary-street, Leeds.

**LYONSDOWN, NEW BARNET, Sept. 7.**—For the erection of master's house, boundary wall, &c., at the schools. Mr. G. B. Williams, architect, Frederick's-place, Old Jewry, E.C.

**METROPOLITAN BOARD OF WORKS, Sept. 24.**—For the formation of carriage and footways in Wilderness-row, E.C. Sir J. W. Bazalgette, C.B., Engineer to the Board Spring-gardens, S.W.

**NEWEASTON-ON-TYNE, Sept. 8.**—For the erection of a new club house in Westgate-road. H. P. Manning, architect, 6, Mitre-court-chambers, Temple, E.C.

**OTLEY, Sept. 8.**—For additions and alterations to the paper mills. William Bakewell, architect, East Parade, Leeds.

**ST. PANCRAS, Sept. 14.**—For painting and keeping in repair about 3,336 lamp columns, head irons, and lanterns. T. E. Gibb, Vestry Hall, Pancras-road, N.W.

**STOCKTON-ON-TEES, Sept. 14.**—For the erection of a new hospital in Bowersfield-lane. E. E. Clephan, architect, Elysian-place, Stockton-on-Tees.

**SUNDERLAND, Sept. 14.**—For the sewerage and drainage of South Hylton. Mr. J. Tillman, Surveyor, 5, Bridge-street, Sunderland.

**TADCASTER CEMETERY, Sept. 10.**—For erecting chapels lodge, boundary walls, and laying out grounds. Messrs. Atkinson, architects, 12, Micklegate, York.

**WALTON-ON-THILL, Sept. 14.**—For the execution of sewage works. Messrs. Goodison, Atkinson, and Forde Civil Engineers, Orange-court, Castle-street, Liverpool.

**WANTAGE TRAMWAY CO., Sept. 15.**—For constructing about 2½ miles of single line tramway. Mr. G. Stevenson, Wantage.

**WAREHAM, Sept. 7.**—For the erection of new wards at the Warham and Parbeck Union Workhouse. Mr. F. Filiter, Wareham.

**WAR DEPARTMENT CONTRACTS, Sept. 8.**—For the erection of married soldiers' quarters, infant school, stores, workshops, &c. at Horfield Barracks, Bristol. T. Rowe, Surveyor, Royal Engineer Office, Bristol.

**WAR DEPARTMENT CONTRACTS, Sept. 8.**—For works and repairs at various stations on the East Coast. Royal Engineer Office, Abbey Field, Colchester.

**WEARDALE AND SHELDON WATERWORKS CO., Sept. 12.**—For the construction of two service reservoirs near Bishop Auckland. Mr. W. Bouch, engineer, North-road, Darlington.

**WEST HAM LOCAL BOARD OF HEALTH, Sept. 7.**—For executing jobbing works to sewers, &c. Mr. Lewis Angell, C.E., Town Hall, Stratford, E.

**WEST HAM LOCAL BOARD OF HEALTH, Sept. 7.**—For the collection of house refuse, ashes, and streetsweepings. Mr. Lewis Angell, C.E., Town Hall, Stratford.

**WEST HAM LOCAL BOARD OF HEALTH, Sept. 7.**—For the supply of broken Guernsey granite, Bombay and Port Philip stone, flints, and coarse and fine gravel. Mr. L. Angell, C.E., Town Hall, Stratford, E.

## LATEST PRICES OF MATERIALS USED IN CONSTRUCTION.

(From the Public Ledger.)

		LEAD.				
Pig Foreign	per ton	£20	0	0	£21	0
" English W.B.	"	22	10	0	23	0
" Lead Co.	"	22	5	0	22	15
" Other brands	"	21	2	6	21	5
Sheet	"	22	10	0	0	0
Shot Patent	"	26	0	0	0	0
Red or minium	"	23	15	0	0	0
White Dry	"	23	10	0	29	0
ground in oil	"	0	0	0	0	0

	IRON.					
	per ton	£4	2	0	£0	0
Pig in Scotland, cash . . . . .	"	9	10	0	10	0
Welsh Bar, in London . . . . .	"	8	15	0	9	5
Wales . . . . .	"	10	15	0	11	10
Staffordshire . . . . .	"	7	10	0	8	0
Rail, in Wales . . . . .	"	13	10	0	14	10
Sheets, single in London . . . . .	"	12	0	0	12	10
Hoops, first quality . . . . .	"	10	10	0	11	10
Nail Rod . . . . .	"	17	0	0	19	0
Swedish . . . . .	"					

		COPPER.			
British—Cake & Ingot	per ton	£84	0 0	£85	0
Best selected	"	86	0 0	87	0
Sheet	"	90	0 0	92	0
Bottoms	"	94	0 0	96	0
Australian cake	"	86	0 0	88	0
Spanish cake	"	0	0 0	0	0
Chili Bars, cash	"	76	0 0	80	0
" Refined ingot	"	0	0 0	0	0
Yellow metal	per lb.	0	0 7½	0	0

	OILS &c.					
Seal, pale . . . . .	per tun.	£36	0	0	£0	0
Sperm headmatter . . . . .	"	98	0	0	100	0
Cod . . . . .	"	39	1	0	0	0
Whale, South Sea, pale . . . . .	"	28	0	0	0	0
Olive Gallipoli . . . . .	"	47	0	0	0	0
Cocoonut, Cochiti . . . . .	"	43	0	0	42	10
Palm, fine . . . . .	"	36	0	0	0	0
Linseed . . . . .	"	26	10	0	28	0
Rapeseed, English pale . . . . .	"	30	0	0	0	0
Cottonseed . . . . .	"	27	5	0	27	10



# THE BUILDING NEWS.

LONDON, FRIDAY, SEPTEMBER 11, 1874.

## WHITE BRICKS.—I.

**T**HE bricks known as white bricks in the building trade are of various tints of yellow, from pale straw-colour to deep yellow. With this explanation we will proceed to describe the manufacture.

### MATERIALS USED FOR THEIR MANUFACTURE.

These are, of course, principally clay and sand; but chalk, coal-dust, breeze, soot, or small quantities of sulphur are also used in their manufacture. These last-named substances are combined with the clay, partly to act as fluxes to vitrify the silica, but principally to reduce the peroxide of iron contained in the clay, and which causes it to burn of a red colour, to the hydrated protoxide of iron, which makes the bricks burn of a lighter or darker shade of yellow, according to the quantity of iron present.

### WHITE BRICK CLAYS ARE OF TWO KINDS.

1st. Those under their natural state which will burn of a white or pale yellow colour. These, before burning, are either white, brown, blue, or black. The colour arises from the combination of vegetable substance with the clay, and disappears in the burning. The colour of the clay before burning is not, however, a safe test to rely upon, as many blue clays burn red, owing to the sand contained in the fissures. The blue clays burning white or yellow are of a peculiarly solid, soapy consistency, without any grit.

2nd. Those artificially combined and prepared. Almost every strong clay which does not contain more than 6 per cent. of iron will form a yellow, commonly called a white, brick, provided the clay is strong enough to receive the requisite quantity of chalk. Clays burning a pale red will burn yellow if mixed with a fusible white sand. This description of sand is often found upon heaths, and contains a large quantity of potash, from admixture with the decayed vegetable matter. This sand is, in its natural state, of a grey colour, and will burn white, yellow, or red, according to the quantity of iron contained in the gravel from which it has been formed. Sands burning of a light red may frequently be made to burn yellow by mixing a varying proportion of from 1-5th to 1-3rd of soot or coal-ashes with them. If a large quantity of chalk has to be mixed with the clay, and the clay is very refractory, the bricks are apt to be of a very friable nature when burnt. In this case it is better to add about 1-6th part of finely ground coal-ashes, or 1-4th part of fine breeze, to the mixture of clay and chalk. The bricks in this case will burn yellow externally, but the body will be vitrified like a London stock. A few lumps of sulphur, with some wood fuel introduced into the fire-holes just before burning off, will sometimes greatly assist the process of producing a good yellow colour, but this is by no means a reliable plan, and the results are very uncertain.

*Names of some of the best White Bricks.*—White Suffolk bricks, Essex White bricks, Arlsey bricks, Medway bricks from various companies, Ewell White bricks. Stocks, Seconds, Paviours, and Malms from the brick-fields round London; Exbury bricks, Cowes White bricks, White bricks from the Dorset and Devonshire clays, known by various names.

### PACING BRICKS DIVIDED INTO FOUR CLASSES.

*Solid Bricks, plain.*—These are generally 9in. by 4½in. by 2½in., so that four courses may rise 11in. with the joint of mortar.

They are sometimes made 3in. thick. At other times, especially for the London market, only 2 1-8in. thick. With mild clays a slight difference in the size of the bricks is of comparatively little consequence, as the contraction is very small comparatively, and the lumps are light and easy for the men to handle. But with very strong clay, such as the Poole clay, which requires a great heat to burn it to a proper pitch, the lumps require to be very large to allow for the contraction; the work is much heavier, and the price paid to the moulders higher. They also cost more to burn, as there is not room for so many in the kiln.

*Solid Bricks, moulded.*—These are of various descriptions, commencing with the simple splay or plinth bricks, arch bricks, mitres for angles, various descriptions of cornice bricks, and moulded bricks for jambs and architraves. Some of the best white moulded bricks the author has met are those manufactured by Messrs. Hooper and Ashby, of Exbury, near Southampton. A few examples are given in drawing No. 1.

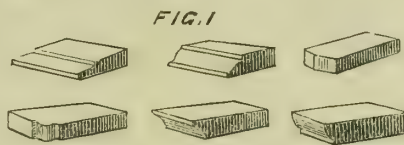
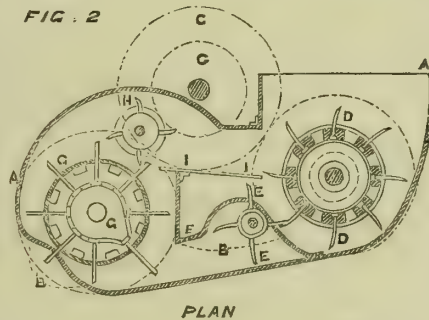
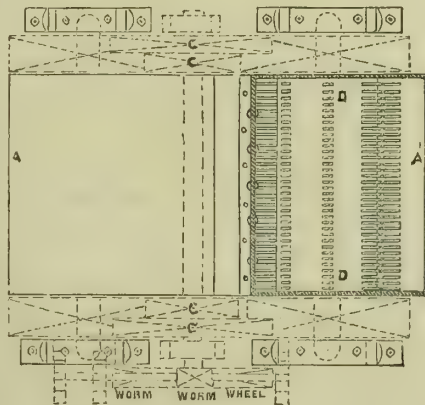


FIG. 2



PLAN



These are sometimes cut with a wire of the requisite form, or, better still, cut with a narrow knife to a template when the bricks are half dry. Bricks so made are generally truer than those formed in moulds, but there is an objection that the sanded face of the brick is removed, and the bricks so made do not stand the weather so well. The mouldings should always be as large as possible; very small mouldings seldom burn true. Other ways of forming moulded bricks will be referred to hereafter.

*Perforated Bricks.*—These are of several kinds, some being made with two large square holes, with the corners rounded off; others with fifteen or eighteen small parallel holes in two rows; others, again, with two rows of conical holes 2in. diameter the large end, and ½in. at the smaller end. These bricks all require to be made by machine, as the power required to free them from the pins is far too great to allow of their being made by

hand. These machines are on two principles, viz., those which force the clay through the pins; and, secondly, those which force the pins through the clay. These last-named machines make much the better and firmer bricks, and require far less power to work them.

*Wall Facings.*—These are thin facings of terra-cotta from ½in. to 1in. in thickness. They are of various forms and sections. Two of the best are the Broom Hall Company's Patent of a simple (L inverted thus Γ) section, used with brick quoins for walls which are filled in with concrete; and Follett's Patent, used for walls filled with brickwork, with quoins specially made to work in with the rectangular blocks.

### CLAYS USED FOR MANUFACTURING WHITE BRICKS.

*Some Beds of the London Clay.*—These are thin beds of blue or nearly white clay, intermixed with the mottled clays, and must be mixed with the grey sand before mentioned. The bricks burn of a pale or deep yellow colour, according to the quantity of iron contained in the sand.

*Plastic Clay Beds.*—These supply the principal quantity of clay for the manufacture of white bricks. The best known are Dorset and Devon clays, but the white brick clay from the Plaster clay beds is also found largely in Norfolk, Suffolk, Essex, Kent, Sussex, and Hampshire.

*Gault Clay.*—This is principally made use of at the Burham and other large brickfields on the banks of the Medway, but it is also found at the outcrop of the chalk in other places.

*Fireclay Marl.*—The Newcastle, Stourbridge, and other firebricks, and the Staffordshire straw-coloured tiles, are made from this material.

*White Brick Clay must contain but very little Iron.*—This is specially necessary if the clay is used in a natural state or mixed with sand only. If more than a certain proportion of iron is contained in the clay, it requires to be separated from it as far as possible by running and slipping, or reduced by the admixture of other agents; but these processes are generally too expensive to be used in brickmaking.

### DIGGING AND WEATHERING.

Clay that can be relied upon to burn a good white brick has generally from 10 to 15ft. of top bearing, consisting of gravel, sand, and loam, and from 5 to 10ft. of stained clay above it. Great care is required to be used to remove the whole of this top bearing and stained clay, and thoroughly to clean the whole of the surface of the white brick clay before the cutting is commenced. Small quantities of top bearing or stained clay falling in amongst it will frequently spoil a large quantity of good clay. A platform should be formed on which to deposit the clay, raised not less than 12in. above the ground level, and upon this the clay should be deposited in layers not more than 6ft. thick, so that the air may pass through it as far as possible. These heaps should be turned over once or twice before using, as otherwise the bottom thickness will get but very little weathering. The more weathering clay can have before using, the better, as the subsequent labour is thereby so much diminished; no plastic clay ought to be used for brickmaking which has not had six months' weathering and been turned once.

These remarks will apply to all strong clays, but are intended to apply more specially to the Beacon Hill clay, near Poole, previously referred to in an article on firebricks by the author, which appeared some months ago in the BUILDING NEWS, and in describing the manufacture of white bricks generally, unless specially mentioned otherwise. The modes of manufacture referred to will be those practised in making white bricks at Beacon Hill.



**Dry Grinding.**—This is required for all strong clays, as otherwise, even after long weathering, hard lumps will be found in the clay, which will not take the water. The best arrangement for dry grinding is to use a pair of edge-runners revolving on a cast-iron plate fixed on a floor of brickwork fitted with scrapers so arranged as to carry the crushed clay over a grating outside the rollers. Such a clay-mill is described in my former article on firebrick making. Crushing rollers in pairs are also used for the same purpose, with a riddle attached for screening the clay after it has passed through the rollers. This arrangement does more work than the edge-runners, but does not do it so well.

**Screening.**—Some clays, such as the Gault clays, contain a great deal of rubbish, and require to be screened before they can be mixed with ashes and pugged.

#### MACHINE FOR SCREENING AND MIXING.

Such a machine was designed by the author for screening and mixing Gault clay with ashes, of which Fig. 2, is an illustration and the following a description:—

- A A'.—Wrought iron hopper and casing.
- B B'.—Gratings.
- C C'.—Driving wheel and pinion.
- D D'.—First set of revolving cutting knives.
- E E'.—First set of cleaning and separating knives.
- F F'.—Inclined plane for getting rid of stones and refuse.
- G G'.—Second set of revolving cutting knives.
- I I'.—Upper inclined plane.

The action of the apparatus is as follows:—The clay in the rough state is filled into the hopper at A'. It is cut and separated by the first set of cutting knives, D D', and carried round by them till the knives engage set of cleaning knives, E E', which remove everything from the cutting knives, throwing the stones and refuse on to the inclined plane F F', and carry the clay down through the grating B, where it is again caught by the second set of cutting knives, C C', and pressed down through the grating B'; everything is removed from the knives by the second set of cleaning knives H, which throw everything that has not been thoroughly ground down the upper inclined plane I I', into the hopper to be ground again.

The mixing of breeze or ashes with the clays is frequently carried out in a very rough manner. A stratum of breeze being merely laid over the clay, and spits from both subsequently cut and thrown into the pug-mill bay without any turning over or mixing. It will not pay to pug the clay twice, and consequently some bricks are found to contain three parts ashes and others none. The chalk mill, or wash mill, used in the London brick-fields, is a much better arrangement, as the chalk and clay are mixed together by iron rakes and afterwards ground together by heavy runners before pugging. The form of the mill is so well known that we need not farther describe it. The principle of this wash mill, or mixing machine, is adopted in several other machines that are used especially in the North of England.

#### RESISTANCE OF BEAMS TO FLEXURE.

FROM an abstract of a paper on Resistance of Materials, by M. Decombe, Engineer of Ponts et Chaussées, published in 1872 and lately read by John S. Barnard, U.S. Engineer Corps, at the American Society of Civil Engineers, we gather some general results touching the values of the resistance to rupture by compression and by extension in beams. The precise ratio of the elastic reactions under a given weight, or those of extension and compression, have not yet been definitely settled practically, and the question is raised, What reason is there for the uni-

versally-accepted hypothesis that these reactions under a given weight are the same, even when the resistance of some materials to rupture is greater for compression than for tension, as cast iron, where it is three times greater for the former than the latter?

The author of this paper observes that the introduction into the known and ordinarily-received formulæ of two coefficients, viz., of resistance to rupture by compression and extension, say  $R_1$  and  $R_2$ ,—instead of the single coefficient "resistance to flexure"—would not change in any degree the process of calculations adopted, while changing the results very considerably, and in a manner eminently useful. This mode of calculation involves a position of the neutral zone not situated at the centre of gravity of the section of beam, as generally held by Navier and others. It is remarked no one can have used the formula of Navier and those derived from it (which place the neutral zone so as to contain the centre of gravity, and adopt a single coefficient derived from the tensile strength alone) without seeing that inconsistent and unreliable results arise. Such formulæ are also founded upon the assumption of the constancy of the coefficient of elasticity under all degrees of strain, and also the assumption of the identity of that coefficient for compression and extension.

Now, from experiments, it appears the coefficient of extension varies from the limits of rupture to slight tensile strain. Taking wrought iron, its coefficient of extension near rupture is only 1-22nd of that for slight tensile strain; and from experiments made by Mr. Barnard upon forged beams of 12 by 15 inches cross-section subjected to the action of the hydraulic press, the coefficient of elasticity deduced varied from 9,558,000 to 1,482,000lb. in proportion as the beam was slightly deflected or bent to the point of rupture. Another similar beam broke with a flexure of one-third of that the first had undergone. In both cases the calculated tensile strength was almost the same. By direct rupture, the results were 20 and 15 per cent. smaller.

As regards cast-iron beams of identical dimensions, the observations made under experiments for these two extremes of flexure gave almost the same coefficients of elasticity, though specimens in the testing machine showed a tensile strength of only two-thirds that deduced from calculation founded on the results of flexure. These experiments show pretty conclusively that formulæ based upon a constant of elasticity for all degrees of strains are not borne out by facts, and also that two coefficients, one for compression and another for tension, are necessary, instead of one based upon an imaginary factor of elasticity.

Another remarkable fact, which confirms the hypothesis given by this paper, is the behaviour of the forged beam under fracture. After rupture the transverse section of beam exhibited an alteration in its form, although perfectly rectangular and straight before the pressure was applied. It was three-fourths of an inch narrower at the under side than at the top, and for about 12 inches the beam was bent to the curve of flexure. This change shows an alteration in the centre of gravity, and also that of the neutral zone; the fracture was crystalline. Again, in experiments made upon an iron target for the front of a casemate at Fort Monroe, consisting of 12in. wrought-iron plates, 4ft. broad, each plate having at the back two vertical wrought-iron beams, 12 by 15in., stepped at top and bottom into masonry, a heavy shot cracked a beam in two, which was afterwards subjected to hydraulic pressure, and deflected 3in. before breaking. The beams broken by the impact of shot did not withstand the pressure which those did that were subjected to gradual pressure, and, further, there was no apparent "set," although the material was the best forged charcoal iron. This is sufficient to show that a sudden impact decreases the conditions necessary to resistance, which, under slow

pressure, are more strongly developed. Barlow explained the discrepancy above alluded to between results of experiment and theory by a species of "longitudinal flexure," though it may be fairly assumed that the centre of gravity and neutral axis do not coincide.

The conclusions here arrived at are not new, yet they are important in the construction of large works of iron. Alteration of internal structure caused by even small loads has been noticed by various experimentists; a permanent displacement of the molecules takes place, and the elasticity in process of time becomes impaired. A cannon fired with a charge of powder producing a strain above the elastic force of the material (this strain varying from one-fourth to two-fifths of that causing rupture) induces such a permanent alteration of structure that a single blow from a sledge-hammer or another discharge will often break it to pieces. It is well known that alteration of internal structure is brought about in some materials by the influence of time alone. Thus the weight of a beam itself is every moment impairing its elasticity, and it may be a speculation not unworthy of our greatest physicists to venture a conjecture as to the probable duration of our great iron beams or tubular girders that now span our great rivers. Iron, however, is not alone in this contingency. Stone is exceedingly uncertain, and great masses of construction have been known to have given way suddenly after the lapse of a few centuries, and without apparent cause.

The inequality of the moduli of extension and compression has been generally admitted by writers on the strength of materials, though the precision required by mathematical hypotheses has tended to disregard the variation, as also those experimental results which show the inconstancy of the elastic force under varying degrees of strain or flexure. That elastic reactions vary in proportion to the load is generally assumed, though this has not fully been investigated with exactness. It is also admitted that the final resistances to instantaneous rupture produced by flexure, either for compression or extension, are identical with the resistances developed by direct compression or extension.

A beam having a triangular cross-section, and supported at its extremities, deflects equally when placed either on its flat base or upon its vertex. The hypothesis of equality for the moduli of compression and extension, which we may call  $E_1$  and  $E_2$ , explains this equal deflection, the neutral axis being regarded as the locus of the centres of gravity of the cross-sections. It is observed however, by the writer of the paper referred to, that though the hypothesis  $E_1 = E_2$  harmonises with the phenomenon observed, "it is not probably essential to its explanation." He shows that if  $R_1$  and  $R_2$  are the final resistances to compression and extension of the material, and if in addition the fibres under compression and extension at equal distances from the neutral surface give elastic efforts in the same proportion as  $R_1$  and  $R_2$ , the observed fact of equal deflection or sagitta for the beam of triangular section is "equally well accounted for, as by the hypothesis  $E_1 = E_2$ , which latter is asserted to be radically "discordant with all the phenomena which practical construction is most called upon to take account of." The equality subsisting between  $E_1$  and  $E_2$  corresponds only to a particular case of the problem, and is therefore to be set aside for the modified hypothesis of two coefficients of resistances.

#### THE BEAUTIFUL IN ART.—III.

BAIN, in his theory of the *Æsthetic* Emotions, shows, in addition to the propositions laid down in our last, that special emotions enter largely into the Fine Arts. Wonder, surprise, novelty, are sought



in Art as in other non-artistic pleasures. Thus fear and tender emotion in idea are made use of as pleasures of art. Burke identified tenderness and delicacy with beauty, and in the Association theory of Alison and Jeffrey suggestions of warm human affections are placed above all other human causes; thus the feminine exterior is considered beautiful, as boding forth the graces of amiability, &c. The egotistic group of emotions, even ideally viewed, are adverse to the spirit of art. The intellectual emotions, says Bain, from their liberalising character, would be æsthetic, "but the province of truth in which they appear is too arduous to be a source of unmixed pleasure."

Harmony is considered an especial source of artistic pleasure. Agreeably to this great physico-psychologist's views, harmony proceeds from a physical law—that of self-conservation. In harmony the nerve currents are mutually supporting, while in the opposite state of conflict there is opposition and loss of nerve power. Sound and its harmonies constitute, in their sensations, a department of Fine Art. In the uniformity of a musical note as a constant number of beats per second, there is a source of pleasure; thus harmony is the concurrence of two or more sounds related as to number of vibrations in a simple ratio, as in the octave of 2 to 1. In a melody the same regularity appears; also in visible proportion; the intervals are equal, the beats unequal. Again, the varying notes of music depend on the law of "Relativity," or alternation and remission. Thus we have light and shade, loud and sharp sounds, each obeying a law of harmony with variety. Alternation gives pleasure to oratory no less than music; we have the gentle beginning, the gradual rise, the climax, and the ending fall; a series of lesser rises and falls also pervading the piece.

We come now to another and distinct source of the Beautiful in Art which has more immediate reference and interest to the architect, or, as Bain calls them, the pleasurable sensations of sight with their harmonies. We would here premise that architects of the present day have far too little regard for analytical investigations of this kind. They will devote years and lives to the delineation or copying of forms and works more or less beautiful or pleasing, while the study necessary to enable them to see wherein their beauty lies, or to detect the causes and principles which have underlain or been consciously or unconsciously followed by the old masters who produced those works, is voted tedious or unnecessary. We are bound to say no class of scientific artists are so led by their eyes as architects, yet no class are so blind, simple, or unquestioning in their faith. Of all men, perhaps, none are less given to scepticism, or to whom the lines of the Poet Laureate may be so aptly addressed—

"There lives more Faith in honest Doubt,  
Believe me, than in half the Creeds."

The unwavering acceptance of styles and forms of art, instead of a critical analysis of them, has done more to produce a school of mannerists than original artists. We know it has been observed by Macaulay—we believe in his essay on Milton—that in "proportion as men know more and think more, they look less at individuals and more at classes." They therefore make better theories and worse poems." Milton, we are told, doubted whether he had not been born an age too late. He looked back, we are told by the same writer, with regret to a ruder age of simple words and vivid impressions. Now this is strictly true, but must be construed philosophically. It will not do for the artist or architect to say he is living too late, or to affect the Classic or Middle Ages. As the vivid images and impressions of a primitive age disappear, so the artist should endeavour to grasp the causes that made them beautiful, rather than awaken the images themselves. It would be equally as absurd to recall the

artless vocabulary of the Homeric epic or the odes of Pindar, because these poets drew their pictures from real life. Homer lived in an unlettered age when there was no antiquated past to borrow from. Nature was his only guide. Again, we may admire the Panathenaic frieze and the beautiful sculptures of Phidias and Polykleitos, but no simple adoration or copying of those masterpieces can enable us to conceive and create similar forms of beauty. We cannot return to the youth of the world, and no amount of affected simplicity will help us. But we are digressing somewhat.

The sensations of sight and their harmonies embrace the whole world of Art—light and shade, colour and form. Light is pleasant in proper proportion; hence light and shade become an important source of the beautiful in art. Chiaro-scuro is a power in the hands of the true artist, as with Rembrandt and Correggio. Sir Joshua Reynolds observed the proportion of light in some of the best pictures exhibited, and he found by experiment with a shaded sheet of white paper relatively graduated, that the general practice was to "allow not above a quarter of the picture for the light, including in this portion both the principal and secondary lights; another quarter to be kept as dark as possible; and the remaining half in mezzotint or half-shadow." Rembrandt appears to have admitted much less, scarce an eighth. In Rubens there is more than a quarter, and a sacrifice of effect resulted.

Take colour as another instance of sensation. It is regulated by harmony also; there must be a balance of colours according to the proportions of the solar spectrum (see our articles on Colour). The eye exposed too long to one colour desiderates another, and is most pleased with the complementary colour; thus red harmonises with green, &c. Bain says colour harmony is the maximum of stimulation of the optic nerve with the minimum of exhaustion.

We now come to Form. In what is called "the waxing and waning motion" we have an elementary pleasurable effect. The curve line represents the same. There are harmonies of space as well as harmonies of motion. Equality of intervals, as in the columns of a colonnade, or window spacing, has a pleasing effect. A still more varied harmony is produced when the intervals alternate with larger breaks or subordinate gradations.

The subdivisions of space should be in simple proportions to produce pleasing effects, as halves, thirds, fourths. Thus the beauty of oblong forms and triangular figures depends on this. An oblong room having its length to width in the ratio of 3 to 1, or 3 to 2, is far more agreeable than if no ratio were discernible; the same as regards the three dimensions of length, width, and height. Again, take angles. Equal and simply-divided angles are most agreeable, as angles of 30°, 45°, or 60°, which are commensurate divisions of the quadrant.

In straight form laws of proportion determine beauty. These are subject to considerations of Fitness. In curved forms the charm may be enhanced by proportions and pleasing associations. The circle and oval both have the element of proportion; a curved line suggests ease, delicacy, and grace, while straight lines require painful restraint and discipline; thus all the movements of the human body are in curves. Thus as regards straight lines and rectilinear forms, fitness, and obvious utility must be prominently expressed, and hence all architectural forms and combinations are embraced in the latter category. Thus in vertical dimensions the idea of pressure and support become paramount in the determination of form—adequate and apparent support is a relief to the mind, as deficiency suggests painful ideas. Thus we look with pleasure and satisfaction on the columns of Greek temples and on wide-spreading bases and

stylobates. The pyramid and the buttress become each a type of formative beauty, while in the lofty spire supported on a well-butressed tower, there is a similar degree of pleasure felt, which would be lessened considerably if no diminution or pyramidal outline of tower was discernible. Examples of flimsy construction and insecurity are oppressive and unpleasing from the want of those ideas of satisfied strength and security we are speaking of. Next to adequate support is doing it with the least expenditure of labour or material. A column over-massive or disproportionate in bulk is unpleasing from this reason.

The expenditure of the least amount of force or material in architectural support, for example, gratifies the feeling of Power. Great effects attained with appearance of ease are gratifying. An obelisk is more pleasing than a pyramid. A column with the sensuous refinements of entasis and diminution is a still greater refinement, while a colonnade or peristyle, as that supporting St. Paul's dome, and an arcade, are satisfactory and pleasing instances of support to superimposed masses. We may instance the same principle in balusters, where easy support is added to grace in outline. In fictile art also, ease of support is combined with proportions and curved forms.

The Symmetry of form is an example of the same principle, or at least may be referred to it. Thus we call a tree beautiful when its branches are distributed well all round. There is a sense of balance gratified; we cannot call it so when the tree is of stunted growth, or the growth has been on one side; we may call it picturesque, but not beautiful. We shall find indeed, that equilibrium has a great deal to do with our sense of beautiful forms, both in Art and Nature, and, in short, symmetry appears to be based upon it.

We will adduce some other instances of this kind of architectural beauty in our next, when we enter into some complex beauties.

#### NOTES IN THE STREET.—III.

LONDON architecture is singularly dead to all sense of colour; indeed, it would be utter folly to suppose, under the conditions of its sooty atmosphere, any other than a very subdued monotone of colour could exist, and therefore to try and Italianise our northern capital, as some ardent declaimers have attempted, would be futile. Some years ago, when the Italian-Gothic mania seized some of our London architects—or, at any rate, colour-mania—the dingy brick London was to be transformed into a modern Venice—we had red, intermixed with yellow, black, and grey, coloured tiles, stone, and terra-cotta, all claiming a share of employment in the architectural harlequinade. We have outlived this mania, as we predicted at the time, and our architects are content to fall back on simple combinations of brick and stone or terra-cotta.

What we wish now to allude to is the contrast which may often be produced by the admixture of materials. Let it not be understood, however, that even this is absolutely necessary. We would say: Let nothing supersede the higher claims of form, proportion, and that amount of light and shadow which results from those elements. It happens sometimes, however, that a flat façade desiderates a little contrast between its wall or pier surfaces and the architraves, window, and other dressings which combine to make up the *tout ensemble*. Here we have a legitimate source of effect, and if we can combine two materials over which a sooty atmosphere has little destroying or neutralising effect, so much the better. Now architects do not always hit upon the right materials; that is to say, they unite two colours not only mutually destructive as a chromatic contrast, but two which are



remarkably subject to the neutralising effect of smoke and dust—we mean, for example, yellow stock bricks and red bricks. The ordinary yellow or common “seconds” are generally, when new, of a greenish or, strictly speaking, dirty hue—a colour, *per se*, eminently “squeamish” looking, if we may coin a phrase. Miles of streets and interminable vistas of this material meet the eye in town and suburb, and if any peculiarity struck a foreigner it would be the English love of drabby yellow. But this colour, bad as it is, is rendered still more nauseating to a keen sense of colour by the addition of a sooty deposit aggravating its already dirty tint. As we are blessed by a bountiful supply of this stock brick we must make the best of it by using such a contrasting colour or material as will mitigate the prevailing hue. It is quite evident that to place a red brick in contrast aggravates the evil, as it tends to bring out by contrast the element of discord—the greenish hue, and yet this is what is done. We have a yellowish wall colour, and just so much of bright red in patches, as quoins, string-courses, and window dressings, as most effectually intensifies the discord of the contrast.

It is a positive relief from this state of wearisome monotony of this irrepressible yellow brick to find oneself in a neighbourhood of stone-faced buildings, black as they may get; or it is equally pleasing to see red brick taking the place of the dirty yellow, and giving us, by association, the picturesque Classic of Hampton Court or Chelsea Hospital. We have a few buildings which invitingly draw the eye satiated with the dull drab. Such are St. Thomas's Hospital and some of the recent buildings of the London School Board, which here and there break the monotony of the gray or blackened tones of stone and stock brick. Dark as red brick becomes in the lapse of time, we can yet admire its rich marone tints, though overcast with the soot of centuries, as at Lambeth Palace.

No better contrast exists than a deep rich red, and the grey and cool tints of Portland stone employed as dressings. Casting our eye along the Thames, there are a few such contrasts. There is St. Thomas's Hospital, with its broken masses of pavilions, contrasting rather strongly, both in style and hue, with the blackened though warm-looking and friable Bolsover stone of the opposite Palace of Legislation. Long after the last-named palace has lost its traceried face of perishable limestone, the materials of the palace of the physician's art will be fresh and bright.

The new offices just finished for the London School Board between Blackfriars and Waterloo-bridges is another instance of a combination of red brick and stone, which, whatever its merits architecturally, certainly relieves the tedium and adds picturesqueness to the river frontage.

If red brick is sombre and dark, quite as much so is “white” stock when its face gets begrimed, while the former has at least the advantage of improving under the influence of time and smoke, by becoming subdued in tone. The contrast between deep red brick-facing and stone is harmonious, the hues are more nearly complementary to each other than yellow and red, and the tinting of a smoky atmosphere still further aids the contrast. It is satisfactory to see, therefore, some new buildings rearing their walls in obedience to this better taste. Facing Snow-hill, near Smithfield Market, and at the corner of King-street, a building has been erected where a commendable admixture of red brick with white brick and stone is seen. The pilasters are of white brick or Suffolks, relieved between by red; the broad-faced mullions of the upper-floor windows are also red brick, but bands and string-courses of white are introduced freely, and the stone mullions and dressings of the principal windows are so combined as to give a pleasing

variation to a building of moderate pretensions to effect.

It may be asserted that the cost of red brick debars its use. We say, then, let us have at least a pleasing combination, not a violent contrast. If the “seconds” or yellow common stocks must be used, why not be satisfied with a less harsh contrast than red, and use white or Suffolks in dressings and string-courses? There is quite sufficient contrast of tone between these bricks, and the softer and greyer white brick tends to soften the harshness of the yellow, and both become pleasing. We can refer to numerous instances of this admixture. A common yellow stock brick walling may have its windows, as jambs and arches, dressed with the white brick. If a still greater contrast is desired, stone is the best material. We see the effect in the new Royal Hotel at Blackfriars, and other structures where the stock is combined with stone. At least, the best picked white stocks or Suffolks in the dressings, and the common “seconds” or yellow kind in the wall surfaces, satisfy all the claims of harmonious contrast. There is but one way of using the red and common stock bricks, and that is in placing the red in the mass, as the wall surfaces, and the whites in the dressings, as, for example in the new Times Office in Victoria-street. As regards roofing, a greenish slate forms the best contrast with either red or stone, particularly the former, and the purple shades should never be used with red brick. Tile is coming into vogue among our Queen Anne revivalists, and may, by improved manufacture, supplant its rival, slate, in many cases. With red brick, however, as the dominant colour, slates are decidedly preferable.

#### HISTORIC ART STUDIES.

ENGLISH, FRENCH, AND BELGIAN GOTHIC ARCHITECTURE.

(With Double-page Illustration.)

WHEN the monk Gervasius of Canterbury wrote his description of the Cathedral of that town, he was full of enthusiastic admiration for the new style which was inaugurated in the twelfth century. He praises the splendour of the double triforium, the slender pillars, the number of marble columns, and the richly decorated arches and cross-vaults. Formerly, he says, the capitals were rough, the arcades as if hewn with an axe, the principal nave had a splendidly painted wooden ceiling, and the choir a groined vaulted roof; but now everything is more delicate, more refined: the small windows, scantily admitting light, have been replaced by larger ones, and the cross-vaults growing out of rising pillars held together by mysterious bosses are particularly beautiful. In comparing the style of Canterbury Cathedral with that of the French Gothic Churches, we may convince ourselves that we have before us a French work on English soil. Only two other churches of importance bear the same pure French type—Westminster Abbey and the Temple Church in London. The original forms of France were changed and went over into the so-called Early English style. We received a second time our art forms from France, and transformed them according to our national character. Our oldest Anglo-Saxon style was swept away by the Normans, of whose architecture we still possess many remains which we have characterised as Anglo-Romanesque, a style which had at last to yield to the Gothic. The two elements, the Saxon and Norman, though branches of one stem, were for centuries sanguinarily opposed to one another, but at length united again into one nationality. As, therefore, there is no grand phase of social or political life which does not find some corresponding expression in art, we find that the divergent forms of Anglo-Saxon and Norman architectures suddenly combined into the “Early English” style, as the visible form of the fusion which took place between the two

nationalities. There always remained something of the Saxon—the predilection for wood construction; and something of the Norman—the love for small dimensions and square towers, even in the English Gothic. It is essential to treat this art period not merely synthetically, but also analytically. In analysing the isolated elements whose combination produced the English Gothic, we are enabled to understand why and in what our Gothic architecture differs from that of the Continent. The first and most striking cause of the difference is that the Gothic style was from the beginning an importation. It was an art-plant which did not grow out of the hearts of the artists, and much less out of the hearts of the nation. The geometrical tracery, the larger windows, a bolder treatment of the triforium, the flora in the decoration of the capitals, and an altogether freer arrangement of the space, were adopted, but the very ground-plan differed totally from the Continental buildings. We need only study the plan and details of the Cathedral of York (see Figs. 1—6) to convince ourselves of this fact. The choir, with its rich chapels, the chief ornament of Continental Gothic cathedrals, was entirely discarded as strange. The large niches of the Romanesque style excluded the richer division and subdivision of the choir, and these were transferred to the Gothic. Gradually even these semicircular choirs had to yield to a straight wall at rectangles, finishing the building in a sober, matter-of-fact way. The lady chapel which was here and there added had no bearing on the richer and more variegated construction of the choir. The picturesque and mystic element vanished at once even from our then Roman Catholic cathedrals. The omission of the magic play of light and shade, the hidden recesses, the fantastic combinations and the exuberant variation of forms in the chapels round the choir, deprived our churches of the essential element of Gothic art without which the building must always look mean and unfinished; the plan is mutilated, and the edifice becomes, in fact, a headless trunk. The straight wall may be placed arbitrarily anywhere, and has no relation to the completion of the building. From an æsthetical point of view, the architectural law is thus sinned against at the very outset, and one transgression in art, as in morals, leads to many. The proportions of our Gothic Cathedrals are dwarfed; they are not the outgrowth of an infinite striving upwards, of a lofty longing for another world, but of a wise and practical calculation of our ways and means, which led us to think that 60, 80, or, at the utmost, 90ft. (as at York and Salisbury), would amply express our aspiration, whilst the height of the Cathedral at Rheims (see Fig. 14) is 120ft., and that of the Cathedral at Amiens 132ft. The gigantic dimensions of the latter literally raise our hearts on the wings of pious admiration to the Infinite. These proportions stamp Gothic architecture abroad with the seal of the sublime, which is its highest merit, and characteristic of the mystic Teuton Christianity which first gave birth to these stone marvels. If we, with unprejudiced minds, compare the ground-plan of York (see Fig. 2) with that of Rheims (see Fig. 18), or that of St. Ouen at Rouen (see Fig. 16), we must admit that it is unwieldy, nay, even ugly, because it is much too long and unsymmetrical, as additions have been made arbitrarily without sense and congruity. What was done badly in the ground-plan is continued in the compressed and poor height, and an improvement is vainly sought through over-decoration, as may be studied in the form of one of the great central pillars (see Fig. 4), or in the complicated vaulting of the roofs of the choir (see Fig. 5), or of the central part of the nave (see Fig. 6). But no “tours de force,” as the French aptly term them, can indemnify an artistic mind for the absence of the fundamental laws of beauty, simplicity, and taste. We shall never be able to improve our art if we remain embalmed, so to speak, in national prejudices, and content



ourselves by extolling our very mistakes. Religious fervour and love for the Infinite were the spiritual elements out of which Continental Gothic Architecture grew: the geometrical tracery, and the tricks of engineering skill were only means, but not the aim; any attempt to turn the means into the aim is fraught with danger, and leads to a neglect of higher ideal aspiration in art. The soulless outer form is then mistaken for the vivifying spirit. A contempt for, and ignorance of, the higher elements of art brought our Gothic architecture from the severe "Early English" to the "Decorated," and finally to the degenerated "Perpendicular" style; corresponding to the three phases of Greek architecture—the Doric, Ionic, and Corinthian. A calculating spirit has also truncated our outer forms; our spires often look as though we had prematurely exhausted the material at our disposal, whilst the construction is over-decorated with endless repetitions of the same straight lines and small arches. Roof and towers terminate in squares, and do not represent the gradual rising—one of the characteristics of Gothic spires; and buttresses ending in finials, which in our architecture are often dispensed with and replaced by octagonal pointed roofings, give the construction an unfinished aspect. Both the interior and exterior of the Cathedral of Lichfield represent the whole series of different Gothic styles. The construction was begun in the thirteenth century, and not finished until 1421. The ground-plan resembles that of the Cathedral of York, with the exception that it has a pentagonal inclosure added as Lady Chapel. The interior (see Fig. 7) is in an excellent simple style as far as the effect of the perspective goes; but in the section (see Fig. 8) the part marked B, C is the northern half of the transept, which differs from the southern half, marked A, B. In order to be able to construct, in whatever style, correct works, worthy to be considered artistic, we must give up any tendency towards arbitrary fancies and original eccentricities, which must disturb the harmonious effect of any building. A master-mind like Shakespeare knew, with his Titanic genius, how to bring order and connection into the variety of characters which he marshalled up in countless numbers for a common purpose which he never lost sight of; but our Gothic Architectural Shakespeares fall very short of his power, and generally produce an unintelligible confusion of lines, tracings, and ornaments taken from crystallisations or our flora. Some of the ornaments, if considered isolated, are worked with great neatness, as the capitals of the pillars at Lichfield (See Figs. 9, 10 & 11), whilst the roofing of Henry VII.'s chapel at Westminster shows to what degree real art may be lowered by the ingenious tricks of mechanics who produce a sensation of astonishment and bewilderment, instead of exciting our feeling of admiration of beauty. The pendants, supported by internal flying buttresses, threaten, in spite of the skill with which they are strung together, to drop down on our heads. A sensitive man would be very sorry to take his wife and children to rest long under such a roof. To produce a feeling of fear or amazement is contrary to all laws of taste. This kind of grotesque art, composed of whimsical forms, extravagant combinations, irregular shapes, sterile geometrical repetitions, as may be seen on the exterior of Henry VII.'s Chapel (see Fig. 13), ludicrous proportions and engineering contrivances, could only flourish at a period when artists were ignorant of the Antique, and art was the outgrowth of a mystic symbolism. We cannot too often warn our readers to beware of Indian and Buddhistic, of Muhamedan and Japanese influences. We know that in so doing we give offence to the idlers in art, because it is so much easier to be quaint and lamentably bizarre, than to be simple, correct, and tasteful.

In turning to some of the Gothic works of France, we must be struck by their grandeur

and simplicity, by their greater regularity and congruity of style, their harmonious ground-plan, and their masterly unity of purpose. Not without reason did the development of Gothic Architecture in France take place at a period when the miraculous intervention of spirits and saints, and men and women, combined to free the French soil from England's heroes; when the Crown succeeded in suppressing the self-willed vassals and extended its regal power over the Northern, Southern, and Central provinces. Under the glorious reign of Philip Augustus (1180-1223), the Gothic style received its most striking dimensions and forms. The University of Paris became the centre of Scholastic learning, and Architecture was taken under the protection of Church and State. It began to flourish in the towns, through the efforts of the citizens united for a common purpose—the glorification of royalty and religion. The new style developed itself systematically out of the older Romanesque, of which it faithfully retained the fundamental organic elements. The tendency to strive upwards, the pointed arches, the disposition of the choir surrounded by a wreath of chapels, were already cultivated in the Franco-Romanesque Architecture; the new forms were not hot-house plants, artificially transferred from a foreign soil, but grew by degrees, so to speak, as logical sequences out of the older forms. In all the rich variety everything incongruous was avoided. The cathedrals lost their gloomy aspects, and yielded to a picturesque combination of buttresses and flying buttresses, turning the building into a kind of mystic phantom in stone. Every mean feeling was discarded. The mechanical difficulties do not inconveniently obtrude, but are well hidden by a profusion of ornamentation and poetical statuary. The slender pillars rise upwards, forming, with the vaulted roof (as in the Church at Rheims, see Figs. 14 & 18), the well-proportioned triforium, and the elegantly-shaped arches, one powerful whole. In the same style of Gothic correctness the fairy-like Church of St. Ouen at Rouen is constructed (see Figs. 15 & 16). It was begun in 1500, whilst the massive tower, richly decorated with gables, finials, and windows, belongs to the end of the fifteenth and the beginning of the sixteenth century.

The profane Gothic buildings of any consideration must be looked for principally in France and Belgium, or rather in the Netherlands. The most important remains, however, belong to the fifteenth and sixteenth centuries. They show many of the defects of the over-decorated style, being often crowded with superfluous ornamentations which form no part of the structural element, and were merely used to dazzle those who had no cultivated taste. This is the effect produced by the Square of Justice at Rouen (see Fig. 17), and the Townhall at Brussels (see Fig. 19), which was built by John van Ruysbroeck (1400-1441.) This artist discarded the laws of symmetry by dividing the front into unequal halves; but still the building has many merits, as it shows great simplicity and a severe treatment in the details. The crowning stone balustrade has a good effect; but the spire exhibits all the faults of the Gothic style when whimsical originality is indulged. Depressed and vulgar in the highest degree is the Exchange at Antwerp (see Fig. 20.) erected in the year 1531. A square courtyard, 200ft. long and 170ft. broad, is surrounded by low arcades supported by 44 columns with different ornamentations. The ribs in the form of a network are of iron; the arches remind us forcibly of Saracenic buildings, whilst the decorative portions exhibit Renaissance elements. Some of the nations that spend their money on pompous-looking buildings, require a little of everything in return; their edifices are overcrowded with patterns of all ages and styles, and thus they are often worse served than nations that know how easy it is with small means to produce great effects, if only simplicity and taste

pervade private or public buildings. That art is not a true one that always mimics the past without thoroughly appreciating the synthesis of its forms, and the motive spirit which produced them. What a contemporary has said with reference to the recent pilgrimage to Pontigny may be with the greatest force transcribed for the benefit of some of our mock-Gothicists. "No galvanised revival of the movements and attitudes of the Mediæval Church will bring back the spirit of Mediæval times." No imitation of trefoils, corbels, pinnacles, finials, buttresses, &c., will produce genuine Gothic churches. The world has rolled away an incalculable distance from the days in which these forms were the artistic expression of European sentiments; and in science as well as in art, "vestigia nulla retrorsum," is the inexorable law. Those who endeavour to strive against this law construct nothing but monuments of their incapacity to understand our times; or what is worse, they try, through a revival of antiquated forms, either to belie the age, or to bring back a period of narrow-minded bigotry in which, in the sight of those huge cathedrals, men and women were burnt alive. It is the stone millinery of Gothic architecture that has produced Ritualism; with the outer form we think to enslave the bright spirit of progress of modern times. We have produced a reaction which must in its turn arouse a still greater action in all branches of art to obtain forms corresponding to the spirit of the age.

G. G. ZERFFL.

#### SOME NOTES OF A MONTH IN NORMANDY.—II.

WE left Mantes reluctantly for Evreux, but could not make up our minds to stay there, for with the exception of the house of No. 12, Rue Grande, and a fifteenth century domestic tower in the market-place (fairly enough illustrated in the "Dictionnaire," Vol. II., p. 196), Evreux, in spite of its Cathedral, did not appear to me to be a place to take any delight in.

LISIEUX, on the contrary, is a mine of architectural wealth, and to the young man who can rough it, a fortnight or even a month devoted to the quondam Cathedral and the many interesting and beautiful examples of street architecture, would be time well spent. The hotels are of a very low order as regards sanitary arrangements, cleanliness of apartments, and quality of food. Servants are reduced to a minimum, for, besides the cook, one man and one girl were all the Hotel de France could muster in the month of April. Although the price of a cup of café-au-lait with a morsel of sour bread and bad butter was 150 centimes, and a small not over-clean double-bedded room was quoted at five francs per night. But these are trifles, or, at any rate, only characteristic traits of a nation pre-eminent for its refinement. Hotels and all that they contain are happily forgotten directly we saunter out to look about us. Down the principal street of the town, across the Cathedral \* square through the butter market and up that narrow lane where dormers most do congregate, is a short mile, but anyone who would walk it in less than two hours need not stay at Lisieux. Setting the cathedral for the present aside, the timber houses of the town are more than enough to occupy the student for a week. The general composition of the roofs, the way they are arranged at the street corners, the variety of timber framing, the vertical slating and shingles, the carving, the glazed earthenware *epis* or hip-knobs, the arrangement of the brick nogging and the moulded stone bases or plinths, are all the work of a people joying in their work, and imbued with a thoroughly artistic feeling. Foremost among these examples is the grand dormer-crowned house illustrated in "Architecture Civile et

\* The Cathedral is, modernly speaking, St. Peter's Church, the see having been removed to Evreux.



Domestique," by MM. Verdier and Cattois. "L'Auberge du Grand Turo" (its signboard still swings to and fro with a melancholy sound) is anything but an inviting place to mere sightseers or tourists, for from attic to ground everything is grimy with long neglect and accumulated dirt. I had not, unfortunately, time to examine anything more than the dormer itself. Of this I saw measured and plotted from the opposite window, by the help of a friend, enough to prove that the drawing by M. M. Verdier and Cattois—exquisite as a drawing—has the failing common to a large number of so-called measured elevations—inaccuracy of observation. For instance, our neighbours and many of ourselves so often use straight lines and common or simple curves, where a little further time, a keener glance would have shown that such an off-hand treatment was unfaithful to the subject. In this dormer the front or barge rafters are not shaped by the line of a true semicircle, as shown by Verdier and Cattois, nor are the lintels and eills cut horizontally, straight, or level. All the horizontal timbers below the tiepiece are really cambered to the extent of 1 in 16—quite enough, one would think, to make it impossible for anyone but the most inexperienced eye, to pass it over. But the semicircular curved shaping of the outer pair of rafters is a worse error, as at one point the drawing shows that curve cuts into the wood until it reaches the back of the rafter, and the whole thing would thus tumble down were it not for the dragon crawling down under the shoulder of the curve. In reality the curve only cuts in to the extent of half the depth of the rafter, the other half within the curve being fully occupied or lled out by the carving. These are not trifles, however much disposed some scrambling feverish minds may deem them such. These are the things which just make the difference between old work and new. There is a charm about the old we all more or less feel—a charm never, or very, very rarely, found in modern, and this charm, we may depend upon it, is not a mere question of age, but one owing altogether to the natural feeling and artistic spirit as opposed to the essentially unartistic mechanical modern spirit. It is the work of the artist-architect (or builder, if any one prefers the word) that the surveyor-architect can neither feel nor see, much less emulate. It is the eye and hand doing the work, borrowing now and then imperfect mechanical aids, instead of a box of perfect instruments, with eye and hand only as a sort of motive power.

But to return to our dormer. It is not by any means very easy to see it so as to make a drawing of it. The extreme narrowness of the street permits little more than a view of its soffits from immediately below, but if you are civil to the inhabitants of the opposite houses (and the young student should remember that civility and familiar chit-chat go much further with the poor in Normandy than even silver coin in England) there will be no difficulty in getting direct views from two or three different levels, so close too, that you can make out much of the detail, although some of the mouldings must be proved by feeling for them with the fingers. The *epi* shown by MM. Verdier and Cattois does not exist, but there are two of somewhat similar design, made of glazed earthenware, on houses near the Railway-station. The width of the dormer is 7ft. 4in.; the sizes of the openings are 2ft. 8in. by 2ft. 7in., and these are now filled with wood casements, each divided into four panes by ordinary moulded sash-bars. The spaces between the wood framing in the gable have been originally plastered, but the latter alone remain.

Of the many other charming houses; of the tall cusped dormer in the Butter-market; of the corner house at the turning into the south entrance of the cathedral, called the "Maison Starteforte," or of the "Maison Normande,"

I have no time to speak, for the Cathedral bids me hasten on lest Lisieux streets should have more than their share of my necessarily brief notes. The cathedral is especially interesting to Englishmen, possessing many points of similarity with our own Canterbury. Built in the twelfth century, and yet designed in the early spirit of Pointed architecture, before multitudinous detail and elaboration of feature had dissociated most of those elements in architecture generally spoken of as simplicity—grandeur—strength—vigour—repose, it is the interior that exhibits these characteristics to the best advantage—single cylindrical shafts, or, as in the apse, double columns; deep square-planned abaci; broad soffits; large or bold mouldings to emphasise or strengthen arches and openings; delicate or small ones to tone and refine them; breadth of wall-space over arcade; still greater breadth of vault-space—these speak to us of its strength, its repose. But in the apse (of a little later date) there is added to all this a something more excellent still—a refinement of beauty to me simply indescribable, and the reason for which can only be found by careful dissection and analysis. There is a marked similarity of general design between this apse and that of the church of the Abbaye aux Hommes, Caen; but there is also a marked divergence in the relative positions of the horizontal lines, the abaci, and string-courses. Thus from floor to top of the main pier abacus at Lisieux is 18ft. 3½in.; at Caen only 15ft. 9in. From this to top of first string-course at Lisieux is 11ft. 6½in.; at Caen 12ft. 7in. From this to top of triforium abaci at Lisieux is 9ft. 4in.; at Caen 12ft. 8in. From top of first string-course to top of second or upper string-course, in both cases level, or nearly level, with the top of abacus of the capital of vaulting-shaft, is at Lisieux 16ft. 9½in., at Caen 21ft. 6in. From this to top of abacus of clerestory is at Lisieux 13ft. 6in., or thereabouts; at Caen 12ft. 3in.\* Now, by the simple process of drawing out two diagrams, side by side, taking the width of the bay of Lisieux at 7ft. 9in., and that of Caen at 7ft. 11in., it will easily be seen that, if the effect of Lisieux is altogether good, it is to a very great extent indeed owing to the position of the two string-courses—or, in other words, to the proportion which the height of the triforium bears to the total height and width of the apse. There are minor points also that should not be overlooked, and that are again altogether in favour of Lisieux—such as the fringe-like cusping at Caen in the main arch of the triforium. Indeed, in details throughout, Lisieux has the advantage. But perhaps the most important stroke in the architecture of this apse is to be found in the *plan* of it, and in the fact, which only becomes apparent by minute examination, and on paper, that the constructional centre of the vault is found to be about 3ft. further east than the geometric centre of the apse curve. By this arrangement an extension of the apse is obtained, so that in a church measuring less than 27ft. across its central aisle, an apse of seven bays is secured without any unusual effort at crowding or disproportion. That the one defect—common, I take it, to all large apsidal churches—of disproportion between the width of the apse bay and that of the main arcade should also exist here is not surprising, for St. Pierre Lisieux was planned and covered in before Amiens or Beauvais had been so much as thought of. After the apse, the next thing which struck my attention was the carving of the capitals. Most of this is of the strong, broad, flat Early character; but in some of those of the choir, there is added to the breadth a grace and beauty, which is all the more graceful and beautiful because of the breadth. This is markedly seen in the last large cap on the north side. Here the wonderful fitness of each part to its

place, the exquisite harmony of the whole design, and yet the marvellous simplicity of it, render it a model of a Gothic capital. The plan or construction of the carving is strange, for although beneath an abacus that is so little of an octagon as to be almost a square, all the knops of the foliage, both in the lower and upper tiers of leaves, follow the circle of the shaft, and so it happens that on the cardinal or long sides of the abacus the knops are in advance of it, whilst at the four diagonal or short sides they recede. This arrangement may read as a bad one. I might once have so read it myself, and have fancied that the angles of the abacus were ill-supported and looked weak; but having somewhat seen it, *i.e.* seen it so far as a long look at it every day for a week, and a good hour's sketch of it at last can suffice—well, I am not prepared to do other than admire, and advocate its earnest study. The Lantern is another part of the interior of Lisieux Cathedral worthy of special notice. Looking west, the design is altogether admirable. Eastwards it is spoilt by the intrusion of the point of the great choir arch, through the lower string-course coming outside through the south transept. We must turn to look at as grand a composition on a small scale as we shall find throughout Normandy. The buttresses, massive to the top, and unfretted by set-offs, are finished with gables and crowned at their junctions with octagonal spirelets of most lovely proportions, and in the western one of singularly lively section. The eastern spirelet is a straight-sided octagon covered with scales, but the other is like this only in the upper courses, for about one-third of the height below this each side of the octagon becomes two-sided and recessed; in other words, the plan of the spirelet is changed to the sixteen-sided figure formed by two intersecting squares, whilst the scale pattern is alternated with bands of horizontal lines, and the external angles or the points of the octagon are marked by well-defined roll-mouldings. However brief our visit may be, we must still linger for a moment before the doorway of the south-western tower. We shall see nothing like it for mastery of cuspiform in simple strong work for many a day. In the "Seven Lamps of Architecture," Mr. Ruskin has given a very powerful drawing of the arch and spandrel of wall-space between the arch, buttress, and string-course, and I cannot do better than refer my readers to his work. The country round Lisieux should not be missed. Pleasant walks up and down the river lead us to remains more or less interesting, among which the tiled and turreted gateway of the Chateau de Ben-villiers stands out somewhat prominently. Pleasant drives can be taken to the Chateau Oully da Houley, where limited means compel the farmer proprietors to retain things nearly intact. The old wood casements and the glazing, the shutters, and the fittings generally, including even the kitchen and-irons, still remain in use, happily unrestored. On the road to Mesnil-Manger we passed the manor-house of Houbloniere, where we found some extremely charming bits of timber and shingle work, but unfortunately fast dropping to pieces. Through the pretty village of Creve-Cœur, and so to Mesnil-Manger, to meet with disappointment, for of its grand old farm, as M. de Caumont sketched it, three detached fragments are all now left standing, and even these will probably be cleared away before very long. One soon feels tired when disappointment meets one, and so somewhat dispirited I took my ticket and jumped into the next train for Caen.

E. W. GODWIN.

At the meeting of the Margate Town Council, on Tuesday week, some further correspondence was read in respect to the Drainage Scheme, and the Surveyor was requested to inspect the several plans and Sir J. Bazalgette's letter, and report thereon at the next meeting.

\* The Lisieux figures are from my own book, but the Caen dimensions are from Pugin's and Le Keux's Normandy.



## INDIAN FOREST CONSERVANCY.

AS a recent meeting of lumbermen in America has announced the gradual extinction of timber on that continent, and given but a very few years before the face of the country is as bare of timber trees as the paper on which this is printed, it may be as well to resume and conclude the remarks already published in this journal (taken from official sources) on the timber of India. It is doubtful whether the worthy lumbermen will find many to give credence to their assertion on this side the water, but they certainly ought to be the best judges, and no self-interested motives can be imputed to them. However the fact may stand, it is as well to know the resources of our own colonial possessions as far as possible, in order that the building trade may not come to a standstill in future times. There has been considerable agitation respecting the utility of girdling trees. This operation consists in cutting a complete ring through the bark and sapwood of the tree, penetrating to the heartwood. If the sapwood is entirely severed, the tree dies in a few days; but if any connection remains between the sapwood above and below the cut, the tree will revive, and sometimes the wound is entirely filled up with new bark and sapwood. Timber-cutters, therefore, take care to scoop out the sapwood from the recesses which often occur in irregularly-shaped stems. The trees thus killed are allowed to stand for one, two, or three years, when the wood is sufficiently dry to float, and this facilitates its transport by water. A large piece of the wood is sometimes cut from out the stem, which considerably hastens the drying or seasoning of the tree. The enormous saving of labour is thus manifest. In many cases land-carriage is impossible, and, if possible, would so add to the price as to make the timber useless for commercial purposes. Yet it will interest timber growers to know that various Indian authorities report against the practice. Where near, or reasonably near, to its ultimate destination, all are against it. It increases heart-shake—increases the hardness so that the wood-cutters will not fell the tree unless obliged. It is stated that teak is so damaged by the practice that it sells at a very considerable discount. It increases the risk from fire. In some districts it admits the carpenter-bee, which deposits eggs in the bark, and in a short time the outer wood is perforated with holes, time only being required to render the tree worthless.

The Gurhwal pine forests contain much valuable timber, and cover so large an area, that not only being able to supply the entire wants of the East Indian Railway, they have aided in the supply of sleepers for the Delhi Railway, as well as for the East Indian line in the North Western Provinces. The Nimar forests produce teak in plenty, Salce is very plentiful, and Peepul is also found, as well as 35 other descriptions of wood. The forests divide themselves into three lots, one only being valuable—that of Nerbudda, which, joined to another tract which has been bought and annexed to it, forms a compact forest covering an area of about 400 square miles, calculated to yield a revenue of 20,000 rupees per annum. Of the two Government forests of Attaran, one contained at the last survey, 7,485 well-grown saplings; the other is worked by permit holders, and is difficult of access. The forests of the water-sheds and of Touse River contain tracts of fine deodar, cheel, &c., and are situated conveniently for water-carriage. The forest of Sigur yields fine sandal-wood, and returns a profit to Government, but is nearly exhausted. Salem produces sandal-wood, teak, and immense quantities of bamboos. The Goomsur forests furnish vast quantities of sal, and no timber is equal to it for engineering purposes. Its durability under water is, perhaps, unequalled, and it is quite proof against white ants. Sixty-three descriptions of trees are to be found in them, but unfortunately the difficulties of export by sea are great. In the tract known as the Golcondah-hills, the most valuable timber is found, but roads will have to be made before it can be utilised. The Godavery forests to the south

and west, and others to the east and north-east, contain equally fine timber, and are more accessible. In Mysore the valleys are rich in grain and other crops, while the lower slopes are clothed with small dense forests. These are roughly divided into deciduous and evergreen. The first evergreen belt comprises the country in the Western Ghâts and immediately below them, extending from the northern boundary of Coorg to the north of the Sâgara Talook. Its greatest width, which is at its northern extremity, nowhere exceeds 12 to 14 miles, and at some points not more than six. The tree vegetation is magnificent; many of the hills are covered to their summits with heavy forests, while the valleys and ravines produce trees which can hardly be rivalled in India—so luxuriant is their growth, so vast their height, so great their size. In some parts the undergrowth is dense, elsewhere the forest is open; and on all sides trees, with clear stems to the first branch, of from 80ft. to 100ft., meet the eye. The great bulk of these trees can scarcely be realised, except by actual measurement. The more valuable kinds of these trees are poon, wild jack, gamboge, a species of cedar, mara, &c. The second, or mixed belt, extends the whole length of the province, and varies in width from 10 to 40 or 45 miles. It includes the greater number of the timber-producing State forests, large tracts of district forests, and much sandal-wood and bamboos abound in this belt. The tree vegetation of the dry belt is, as a rule, of smaller growth, especially teak.

Such is the conclusion of a very brief examination into our Indian resources, and merely the most interesting facts have been stated, as otherwise the subject would be wearisome. Energetic measures are adopted by the Indian Government towards the conservation of the forests and the keeping up the supply as felling proceeds. With such wise precautions, we may expect a material increase in the yield, and an exemption from that scarcity which the Americans complain of.

## EXTENSION OF THE EDINBURGH UNIVERSITY BUILDINGS.

SEVERAL weeks ago, according to the *Scotsman*, a circular was addressed to the following Edinburgh architects:—Mr. David Bryce, Messrs. Peddie and Kinnear, Mr. John Lessels, Mr. David Cousin, Mr. Robert Anderson, and Messrs. Wardrop and Reid, requesting them to state whether or not they were willing to send in competitive designs for the proposed extension. Mr. Bryce declined to engage in a competition, but the other gentlemen named intimated that they were prepared to do so, and they have accordingly been asked to send in preliminary plans. Mr. Cousin and Mr. Lessels were at first invited to compete separately, but they signified that they should prefer to send in a joint design, and this has been agreed to.

The Committee has indicated that the plans should be drawn in the first instance on a small scale, and each is to be accompanied with a general description. Each architect will be at liberty to send in alternative sketch plans, but no coloured perspective drawings are to be allowed. While desirous of securing due attention to architectural style, the Committee discourage elaborate ornamentation, and give the competitors to understand that excellence of arrangement and adaptation to the purposes in view will be considered of primary importance. The architects are reminded of the value of recent improvements in this class of buildings, and as illustrations of the application of these, reference is made to Owen's College, Manchester; the Physical Museum, Oxford; the Museum of the College of Surgeons, London; the Laboratory and other Science Schools, South Kensington; and various institutions of similar character in connection with foreign universities.

The buildings to be erected are to comprise a completely-appointed Medical School, as also a College Hall, suitable for important academical gatherings. The departments of the Medical Faculty requiring accommodation are nine in number, and the number of students to be provided for by each respectively is as follows:—Anatomy, 400; Chemistry, 400; Physiology, 250; Pathology, 200; Materia Medica, 250;

Surgery, 250; Practise of Physic, 250; Midwifery, 200; Medical Jurisprudence, 200. Each classroom must have attached to it a commodious retiring-room for the Professor; and it is suggested that in arranging the rooms, regard should be paid to the grouping of certain departments—the placing, for example of the Anatomical Museum in a central position with reference to the classrooms for Anatomy, Pathology, and cognate branches. A preference is expressed for roof-lights in the classrooms, as well as in some of the working apartments; while for some special purposes, again, side-lights are required. In the department of Anatomy a lecture theatre is required, which, in the absence of any better design, might be a repetition of the present octagonal building, but with a superficial area of 1,800 instead of 1,700ft. For the Anatomical Museum a spacious hall is required, having a length of 112ft., a breadth of 40ft., and a height of 42ft., with two galleries running round to utilise the upper wall-space. The Dissecting-room should be at least 100ft. long, 40ft. broad, and 30ft. high, and considerable cellarage and courtyard accommodation is indicated as necessary. In the Chemistry department there are required, besides the classroom, a museum, apparatus-room, and some fifteen apartments of various sizes to be used in connection with the teaching of practical chemistry. Here also there must be provision of cellarage and courtyard—a demand which is common to several other departments. Physiology requires, in addition to the classroom, a suite of working apartments, and similar claims are made for the departments of Pathology, Materia Medica, Surgery, Midwifery, and Medical Jurisprudence.

In regard to the University Hall, it is stipulated that three sides shall be furnished with galleries fitted with fixed seats, and that the ground-floor shall be an open area into which moveable seats, or chairs or tables for examinations, may be introduced as required. In galleries and area together there must be accommodation for about 2,000 persons, and the fourth side is to be occupied with a railed orchestra, capable of seating 300 additional persons, and so arranged as to be suitable for receiving the Chancellor and Senatus on graduation days. The main entrance should be under the gallery, other entrances being also introduced along the sides. The shape of the hall is left to the judgment of the architects, but the Committee desire that it should be designed on the best acoustic principles. In addition to the above requirements, the competitors are called upon to provide a janitor's residence, a small reading-room for professors, a small consulting library and reading-room for students, and a belfry, which it is suggested may probably be attached to the great hall. In respect to the question of cost, the Committee request that a limit of £70,000, exclusive of fittings, may be kept in view. The plans must be lodged by 1st December next.

## CHIPS.

Rubens' picture of the Assumption in Antwerp Cathedral is being restored. The restoration of the Cathedral itself, by Vandal, is rapidly approaching completion.

On Tuesday, the sale of the building materials of Northumberland House commenced. The staircase, the great prize of the sale, only fetched £360, and even with the stable fittings the total amount of the day's sale was short of £1,700. The sale was continued on Wednesday, but the sale of the Strand front, which will always live in Canaletti's painting, will not take place till November.

The foundation-stone of the new Convent and schools of Our Lady of Zion, in Eden Grove, Holloway, has been laid. Mr. F. H. Pownall is the architect, and Mr. Carter the builder.

The value of landed estates and other real property sold by auction during the six months ended the 30th June last was, according to a return from the Estate Exchange, £4,873,313, against £4,784,857 in 1873, £3,775,080 in 1872, and £1,903,180 in 1871.

About 30 foremen and clerks in the employ of Messrs. Hill, Higgs, and Hill, builders, of Crown Works, South Lambeth, were entertained to a sumptuous banquet on Saturday last by Mr. W. Higgs, sen., on his retiring from business.

The Cattle Markets Committee of the Corporation of London, in view of the approaching compulsory closing of private slaughter-houses in the Metropolis, have been authorised to construct from time to time, as may be required, 20 additional slaughter-houses upon vacant ground on the east side of the Metropolitan Cattle Market in Copenhagen-fields, Islington, contiguous to the Great Northern Railway.



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## ILLUSTRATIONS.

RESIDENCE AND SCHOOL, CASTLE MOUNT, DOVER—DORMER AT LISIEUX—JUNIOR CARLTON CLUB HOUSE—NEW CHURCH AT LEAMINGTON—ENGLISH, FRENCH, AND BELGIAN GOTHIC ARCHITECTURE.	
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## OUR LITHOGRAPHIC ILLUSTRATIONS.

## JUNIOR CARLTON CLUB, ST. JAMES-SQUARE.

THE Junior Carlton Club, erected a few years since, has two fronts; one in Pall Mall, which was illustrated in the BUILDING NEWS, October 23, 1868, and the other (the subject of the present illustration) in St. James-square. They are each 121ft. long, by 80ft. high from the pavement to the top of the parapet. They are built of the brown bed of the Portland stone, and are at present entirely free from the defects frequently found in stonework executed in London—the result of atmospheric action. On the ground-floor of the clubhouse is the entrance-hall and reception-room; a morning-room about 100ft. long by 28ft. wide, a smoking-room for the members, the grand staircase, service-rooms, w.c.'s, &c. On the first floor is the members' coffee-room, and a visitors' coffee-room, and the requisite serving-rooms; the library, 28ft. square, lavatories, &c. On the second floor are two billiard-rooms, a visitors' smoking-room, card-room, committee-room and secretary's rooms, the former being also used for the house dining-room when required. There are also serving-rooms and lavatories on this floor. The upper floor is appropriated for the male and female servants' bedrooms, of whom between 70 and 80 sleep in the club. In the basement-story are the kitchen, scullery, three larders, servants' hall, cook's room, kitchenmaid's room, vegetable-scullery, china-stores, wine, beer, and other cellars; and between the basement and the ground-floors is a mezzanine-story, in which are situated the still-room, housekeeper's room, steward's room, and several bath-rooms and dressing-rooms. The lift, which communicates between the basement-story and the coffee-rooms, and house dining-room, is worked by hydraulic power, the machinery having been supplied by Sir William Armstrong and Co. The ventilation of the club is provided for by means of a shaft, into which the air-flues from all the rooms are drawn by means of a fan placed above the roof, and worked by hydraulic-power, the water being pumped up by a steam-engine in the basement, which also performs other duties regarding the water supply to other parts of the house. The club consists of over 2,000 members, and there are over 500 candidates for election. The site upon which the house is built is entirely freehold, and cost about £65,000, irrespective of tenants' claims; but large as that sum is, it would probably fetch a much larger sum now.

The contractors were Messrs. Lucas Brothers, who most successfully carried out the works from the designs, and under the superintendence, of Mr. David Brandon. The kitchen, scullery, bath-rooms, &c., were fitted up by Messrs. Benham and Sons, of Wigmore-street, and the lavatories, &c., by Mr. Jennings, of Lambeth. The marble skirtings, pilasters, and other work on the grand staircase were executed by Messrs. Burke and Co., of Regent-street. The carving of the stonework was executed by Mr. Robert Jackson, of Maida Vale. The tessellated pavement in the staircase-hall was executed by Messrs. Minton and Co. The height of the ground-floor is 21ft., and of the first floor 20ft. 6in., and of the second floor 14ft.

## MIDDLE CLASS SCHOOL FOR THE GROCERS' COMPANY.

On the illustration of this school, which we published last week, we should have said "Design submitted by Messrs. H. J. Paull and A. Bickerdike." The error was made by the draughtsman who wrote the title to the illustration.

## NEW CHURCH, LEAMINGTON, WARWICKSHIRE.

We give a photo-litho' illustration of this handsome church, from the designs of Geo. Gilbert Scott, jun., M.A. It is cruciform in plan, though the projections of transepts do not extend beyond the line of aisles. The double gable treatment to the transept is a good innovation upon the ordinary flat-pitched roofs in churches of this style. Another feature noticeable is the roof of nave being continued uninterruptedly to the east end, and the great height of clerestory. The style is Late Decorated.

## RESIDENCE AND SCHOOL, CASTLE-MOUNT, DOVER.

The house of which the illustration gives the front and north sides, is erected of brick and concrete, on the Castle-hill, Dover, for R. Chignell, Esq. The original contract was taken by Mr. Adcock, of Lady-Well, Dover, for £5,000, and the architects were Messrs. Perry and Hanson, of York-buildings, Adelphi.

## LISIEUX.

For a description of the Dormer at Lisieux, measured and drawn by Mr. E. W. Godwin, see his article, "Notes on a Month in Normandy," on p. 307.

## ENGLISH, FRENCH, AND BELGIAN GOTHIC ARCHITECTURE.

For description, &c., of illustrations on this double sheet, see Dr. Zerffi's article, p. 306.

## OKEHAMPTON CASTLE.

ON the occasion of a recent excursion of the Exeter Naturalists' Club and Archæological Society, Okehampton Castle was visited, under the guidance of Mr. T. Andrew, who said that it appeared from Doomsday Book that soon after the Battle of Hastings the barony of Okehampton was conferred on Baldwin de Brionisi, who was said to have built the castle of Okehampton. All archæologists would agree that the main features of the castle were Norman, but before referring to them in detail, it might be interesting to give a plan of these Norman fortifications in general, although probably much less was known of them than of the ecclesiastical structures of the period. These castles usually consisted of three divisions: the lower court, the upper court, and the keep; inclosing the whole was a perpendicular wall of solid masonry, and usually of great strength. The wall was strengthened at intervals by towers, from which the garrison could discharge arrows and stones. On the top of the wall there was a pathway, protected by a rampart; surrounding the wall was a deep moat, or ditch, which in times of danger could be filled with water. In the selection of the site of the castle much care was taken to find a bold natural site, but generally where water was available. Over the moat was a draw-bridge, and the entrance to the castle was through a gateway of no inconsiderable strength. Not unfrequently there would be a tower on either side thereof. Within the first court would be the stables, and within the second the chapel and soldiers' lodgings. But the most important part of the fortress would be the keep; and it was considered a matter of the utmost importance that its walls should be of considerable thickness. There was reason for this, as the keep bore the same relation to the rest of the castle that the citadel bore to a fortified town. It was the last retreat of the garrison, and contained all the apartments of the baron or commandant. This general plan would guide the archæologist in ascertaining the design of Okehampton Castle. It would be perceived that the site was on rising ground, ending in a precipitous rock. Along its southern side flowed the river Okement. From its rocky, elevated, and commanding position, and from its near neighbourhood to a plentiful supply of water for its trenches, it must have been a

place of no inconsiderable strength; and in those days of hand-to-hand conflict no little effort would be necessary to wrench it from its garrison. The outer wall of this fortress probably extended from the west end of the keep to the remains of the ancient gateway at the foot of the slope, and its course around the ruins might be traced without much difficulty. From the surface configuration of the land immediately surrounding the site of the wall, it might be fairly assumed that there was a ditch or moat which could be easily filled from the neighbouring river. Further up the hill, about 140ft. from the first gateway, were the remains of the very massive wall of the inner inclosure or second court. The ruins to the left were most likely those of a chapel, and the common soldiers' residence. As to the chapel, there need not be the least doubt concerning it, for there were the remains of a beautifully-arched window and a piscina in the south wall, near to the east end of the chancel, in a good state of preservation. In the adjoining ruins were very curious arcades or vaulted passages, not unlikely designed for communication with the ramparts. Although the many doorways and windows betokened the Norman-Gothic style of architecture, there were arches of another character near the foundations of these remains; if they were not Saxon, they appeared to Mr. Andrew to be uncommonly like that order, suggesting the possibility of a Norman structure having been erected on the remains of a Saxon fortress. If this were the case, it was not at all unlikely that the Saxons improved upon the works of their predecessors. The keep was a massive but plain edifice. It bore evidence of great strength, for it had nobly withstood the wild blasts of Dartmoor, the changes ever consequent on our varying atmosphere, the wear and tear of eight centuries, and what was, perhaps, still worse, its disuse as a habitable or fortified building for upwards of three centuries. Probably the keep comprised four apartments, the lower one lighted by two loopholes. In the interior of the upper apartment there were a very ample hearth and window, showing that at that early period our ancestors were not insensible to those domestic arrangements which were now considered so essential to comfort. The spiral stone stairs formed an interesting feature in the keep, as they were in very fair preservation, and probably led to the battlements and tower above them.

## CHIPS.

A new Roman Catholic church was opened at Husbands Bosworth, Leicestershire, on the Feast of the Assumption. Mr. Gilbert Blount is the architect.

Philadelphia has a water-supply of 71 gallons per head per day. The corresponding supply of London is only 35½ gallons per head per day.

At the recent annual meeting of the British Medical Association, at Norwich, Dr. Angus Macintosh strongly recommended the adoption of the fan system of ventilating drains and sewers.

The new parochial schools of St. James's, Walthamstow, were opened on Friday last. These schools for 400 children have been built at a cost of £2,500. They are in the Gothic style, brick inside and out, with ornamental red brick arches and open roof. The builder is Mr. Morter, of Stratford, from the design of Mr. J. Ladds, Chapel-street, Bedford-row.

The Public Hall, Wisbech, has just been renovated and redecored, under the superintendence of Mr. Tait, architect, of Leicester.

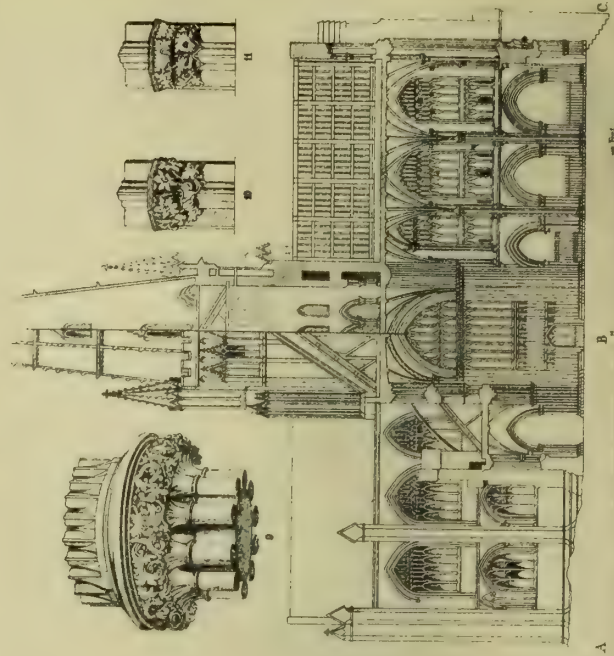
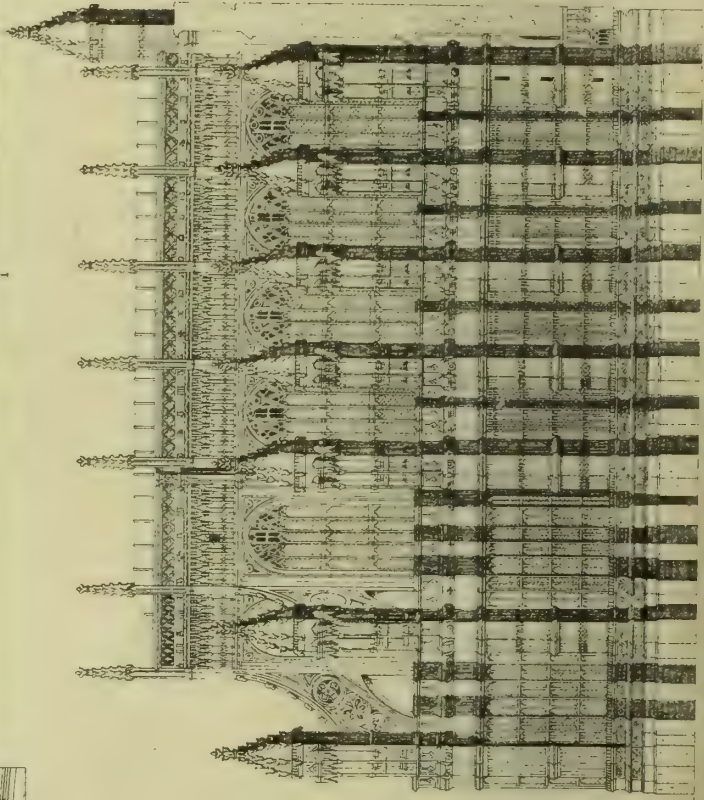
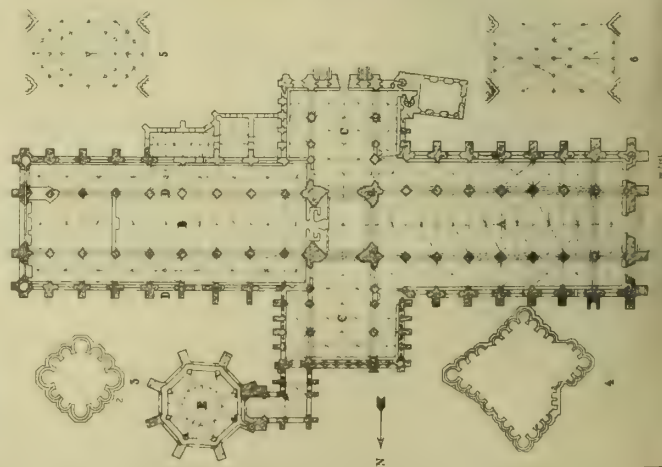
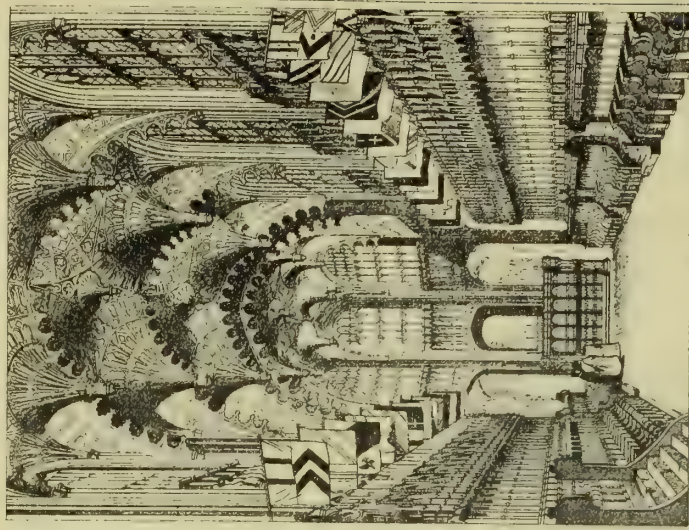
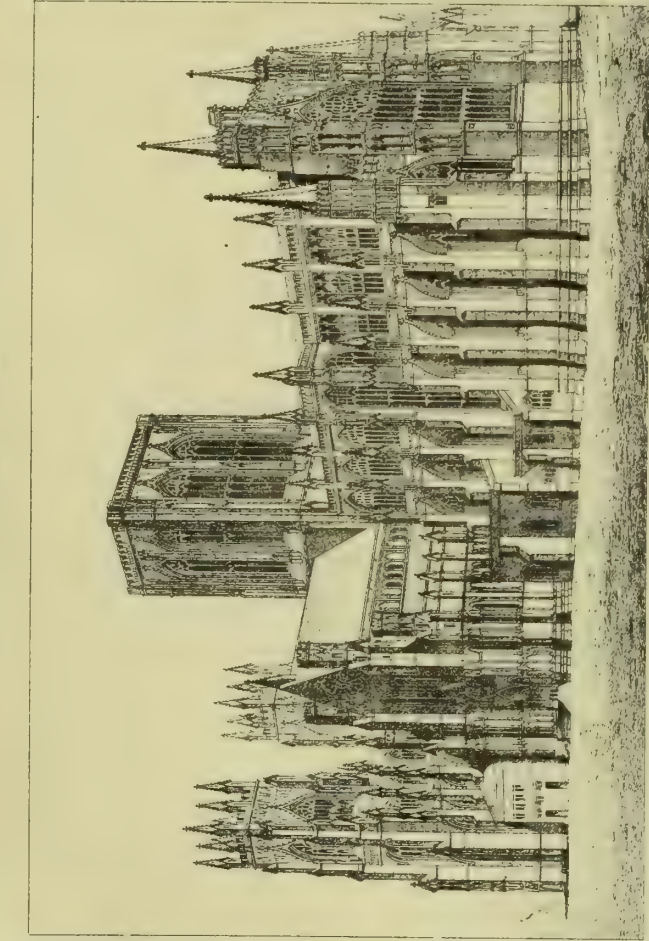
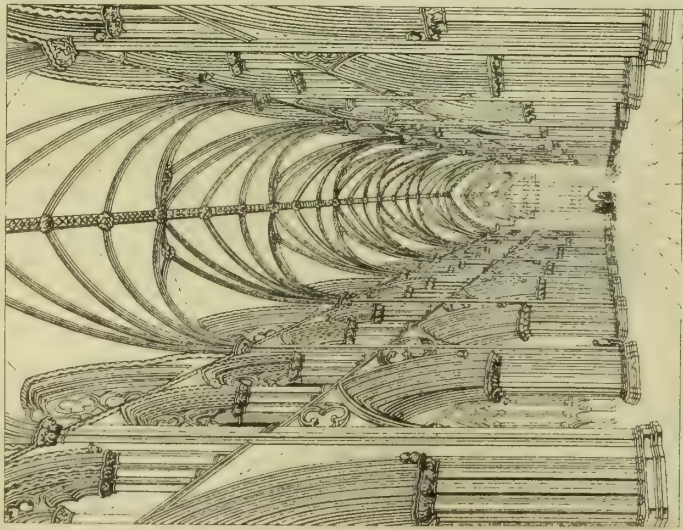
The Hon. Secretary of the Somersetshire Archæological and Natural History Society asks pecuniary assistance from brother archæologists towards the purchase of Taunton Castle. One half of the required sum has been already subscribed, chiefly by residents in Somerset. About £1,500 are still wanting. Subscriptions will be thankfully received and acknowledged by the Hon. Secretary, Museum, Taunton.

A grant of 6,000*fr.* has been made by the French Government towards the completion of the memorial to William the Conqueror at Falaise, his birth-place. The money is to be devoted to statues of the first six Dukes of Normandy, which will occupy vacant niches of the pedestal.

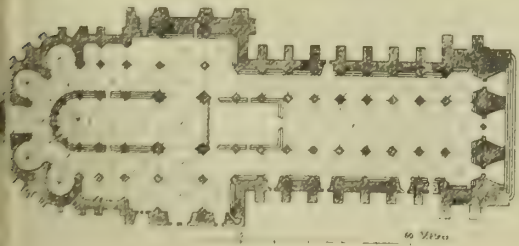




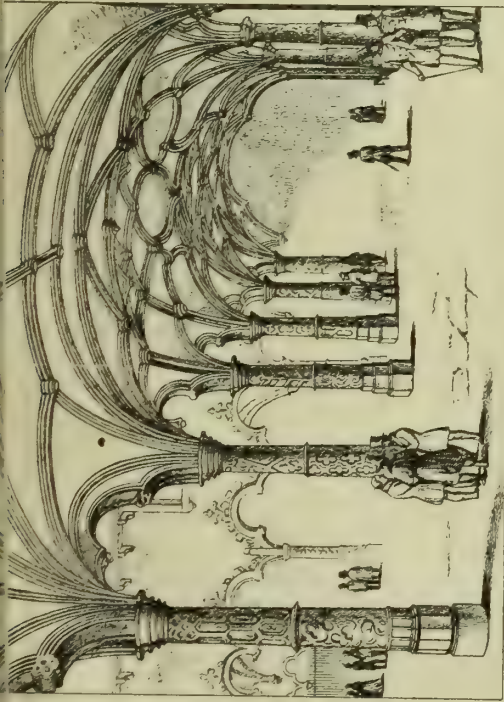




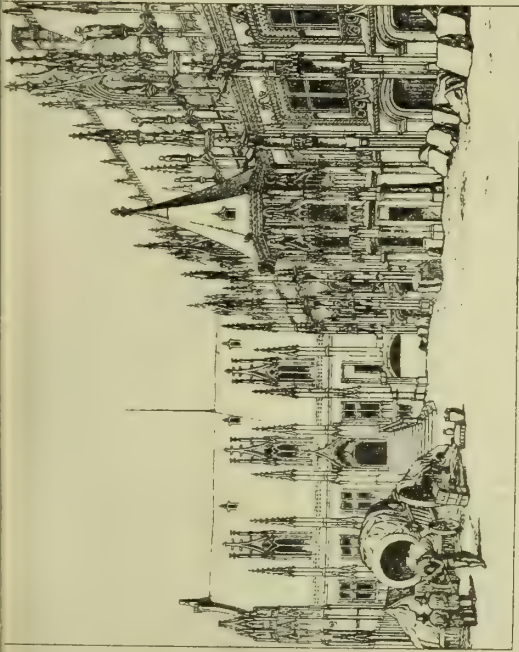




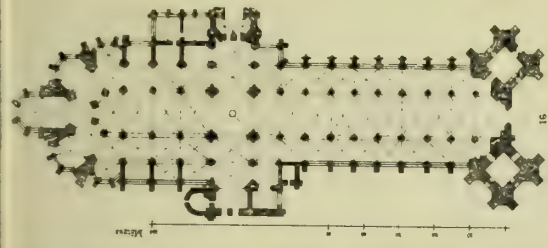
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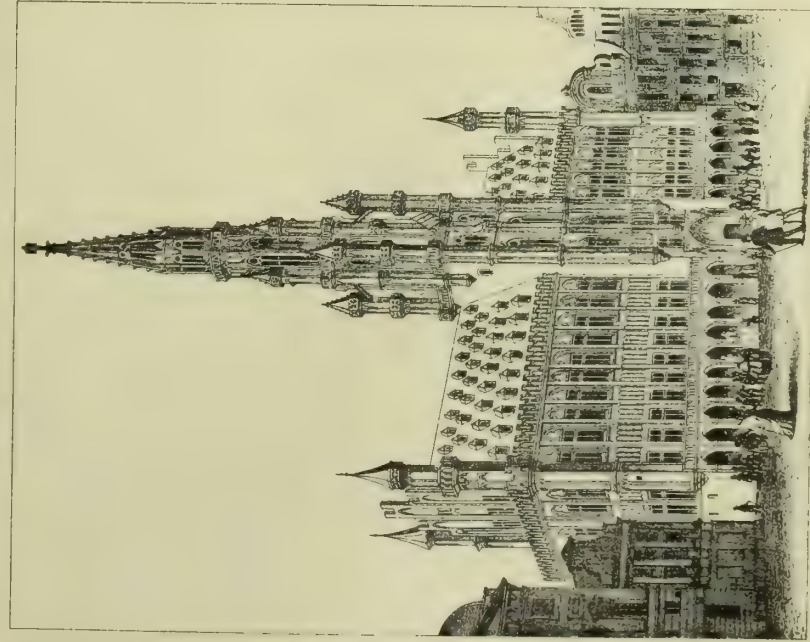
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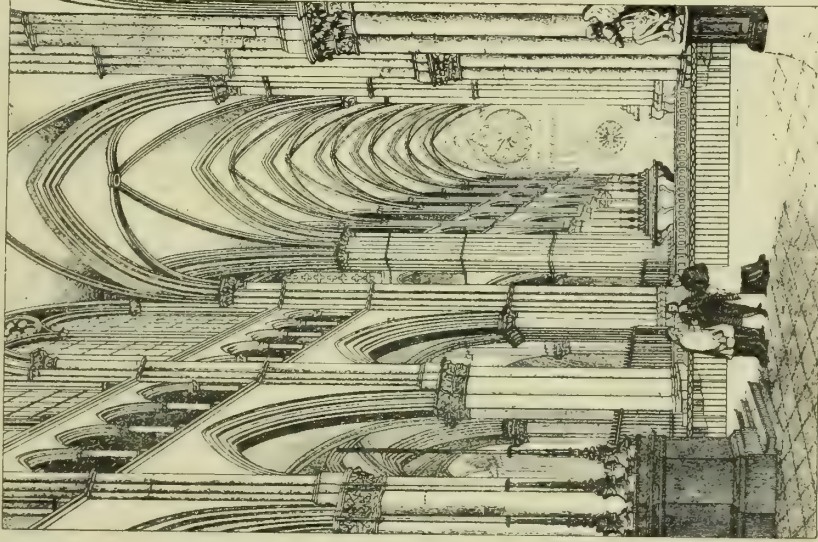
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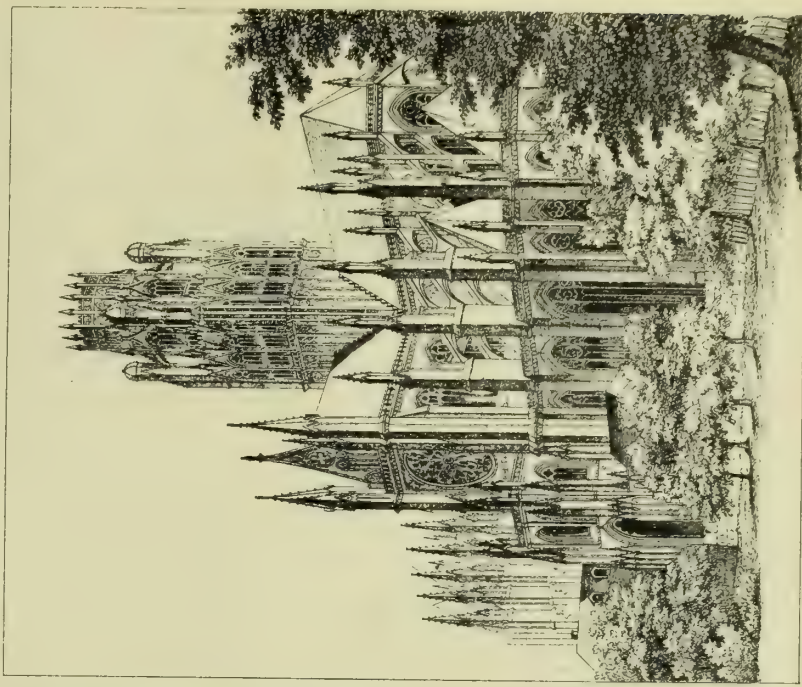
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Photo Lithographed & Printed by James Alcorn & Son, 11, Gray's Inn Road, W.C.

# ENGLISH, FRENCH & BELGIAN GOTHIC ARCHITECTURE.





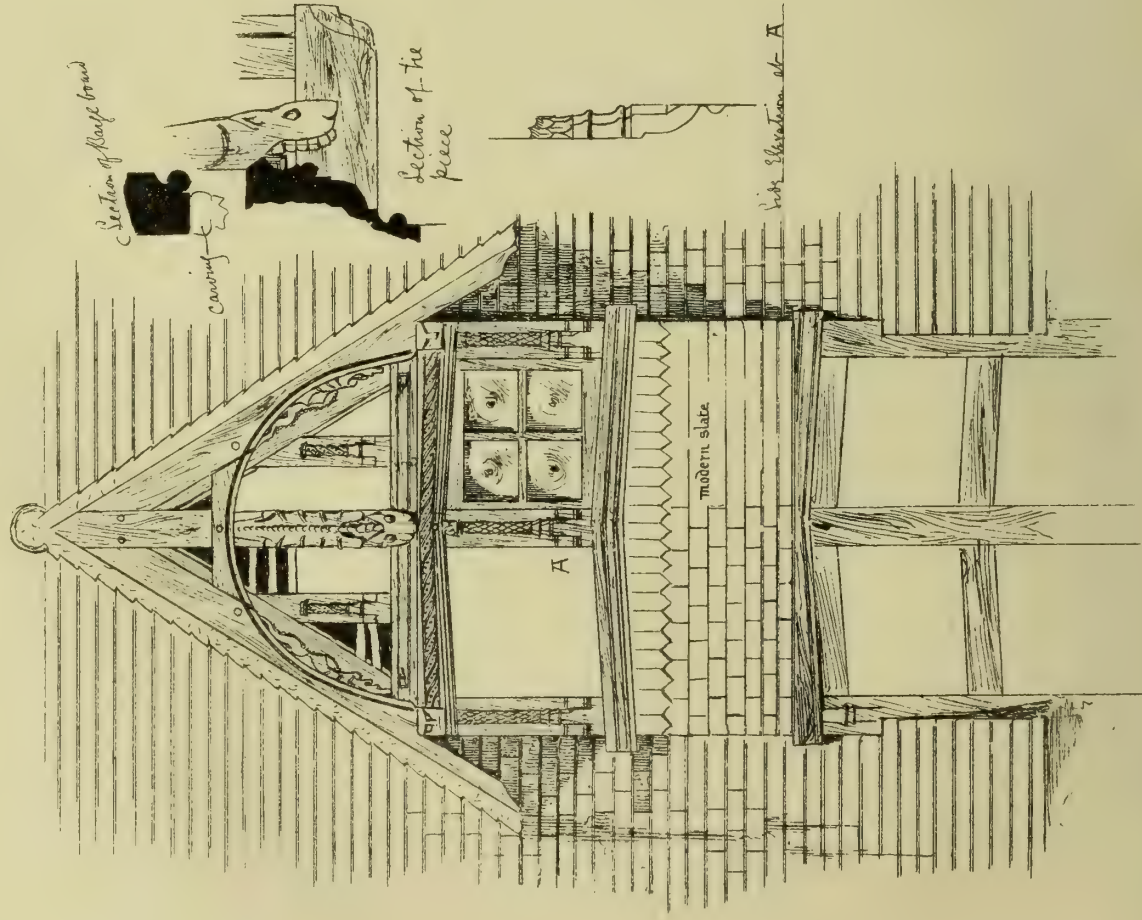




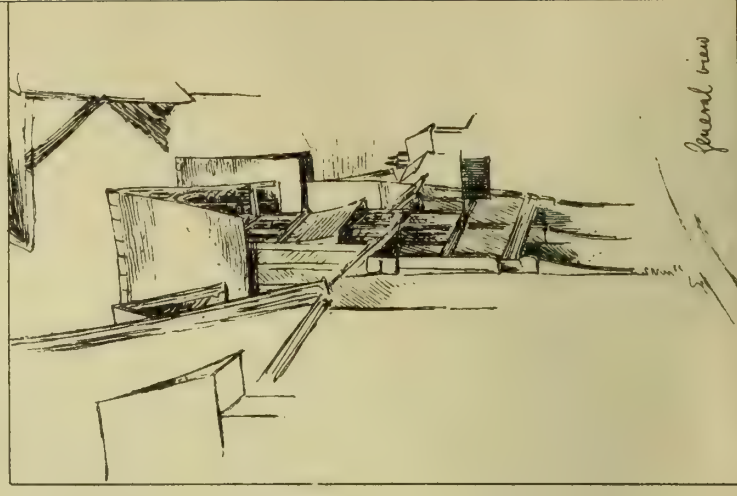
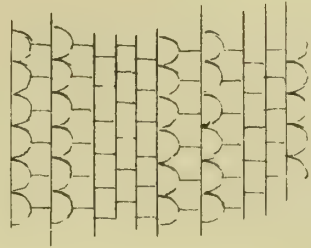
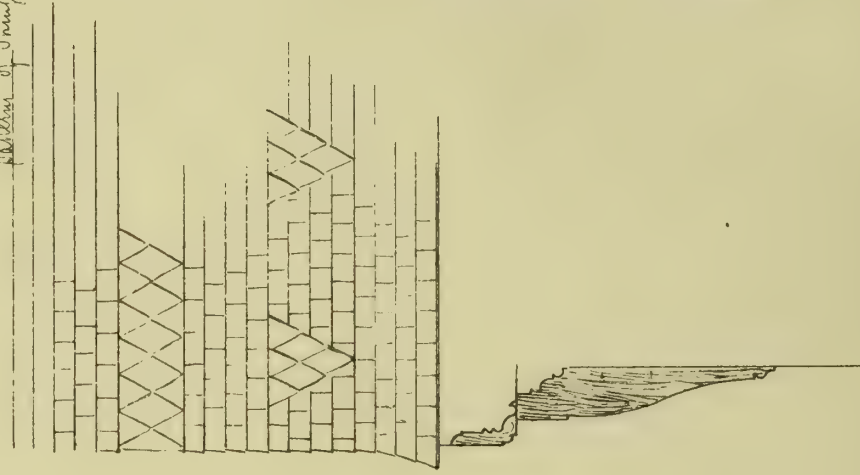


Lisieux.

Designed & Drawn by J. B. Gordon



Section of Sample

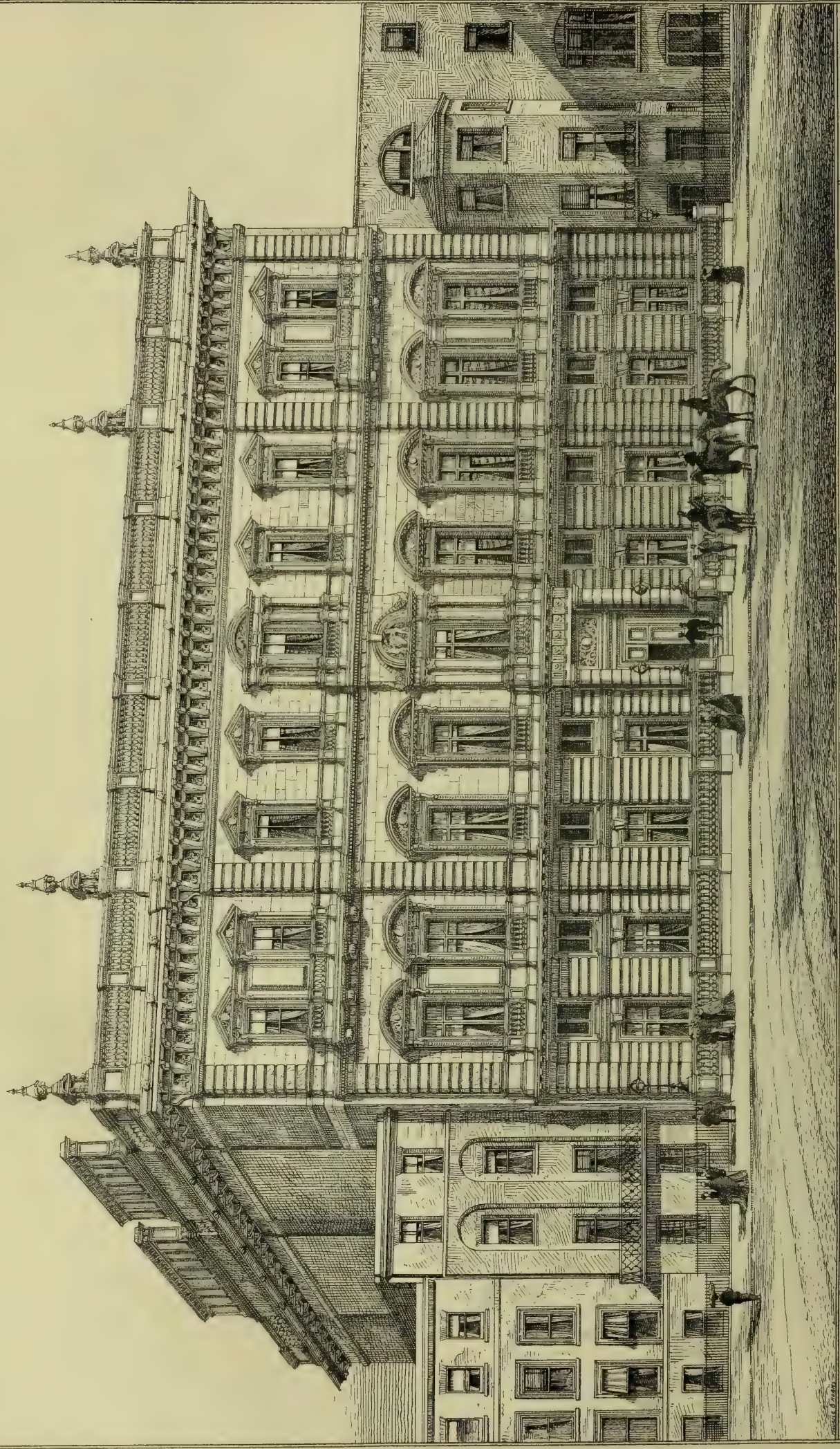


General view







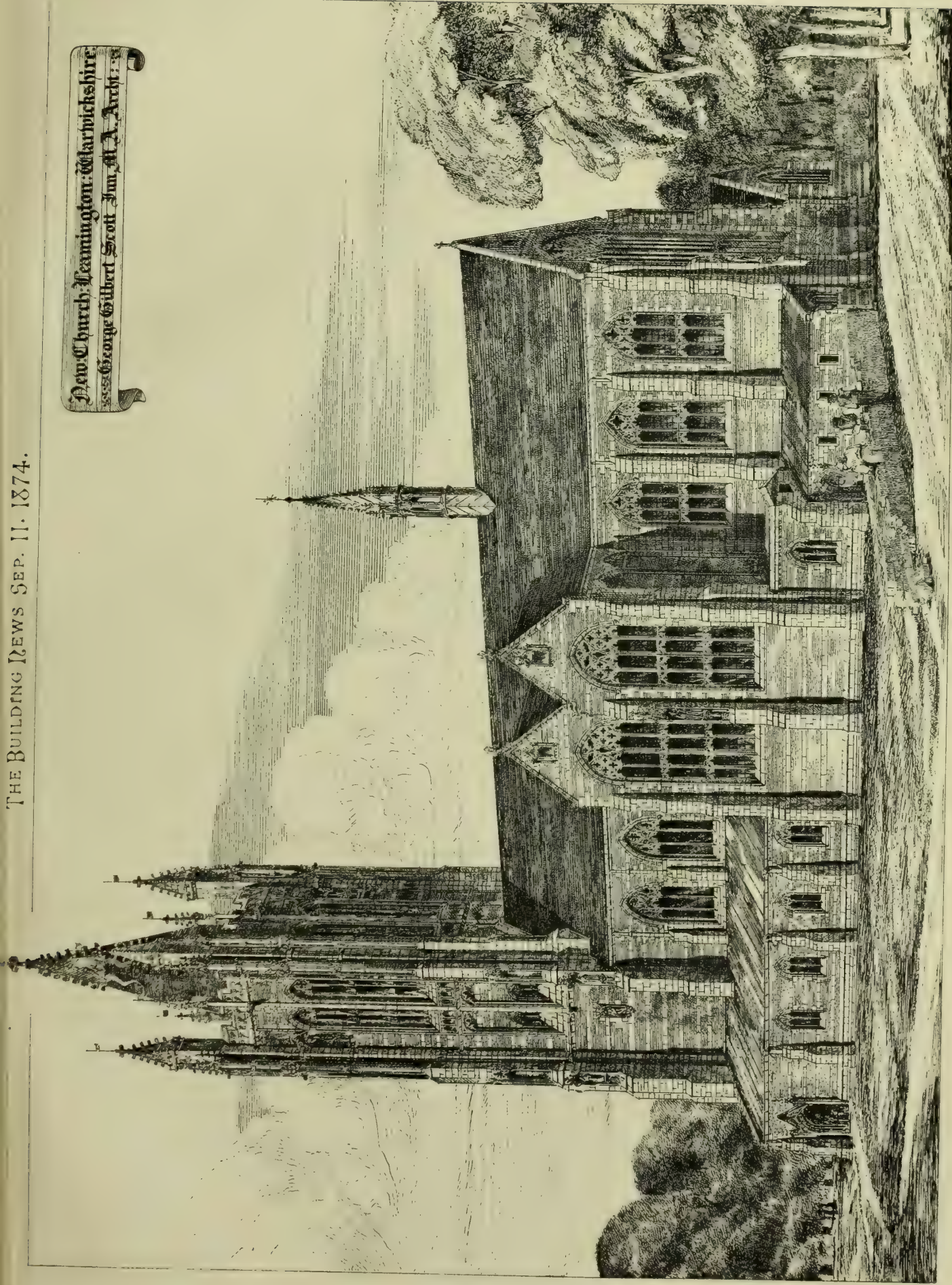


JUNIOR CARLTON CLUB HOUSE, S. JAMES' SQUARE, S.W. DAVID BRANDON F.S.A. ARCHT.

Photo. Lithographed & Engraved by James Alderman 51 Gray's Inn Road W.C.



New Church, Warrington, Cheshire.  
Messrs George Gilbert Scott Jun. & A. Archt.



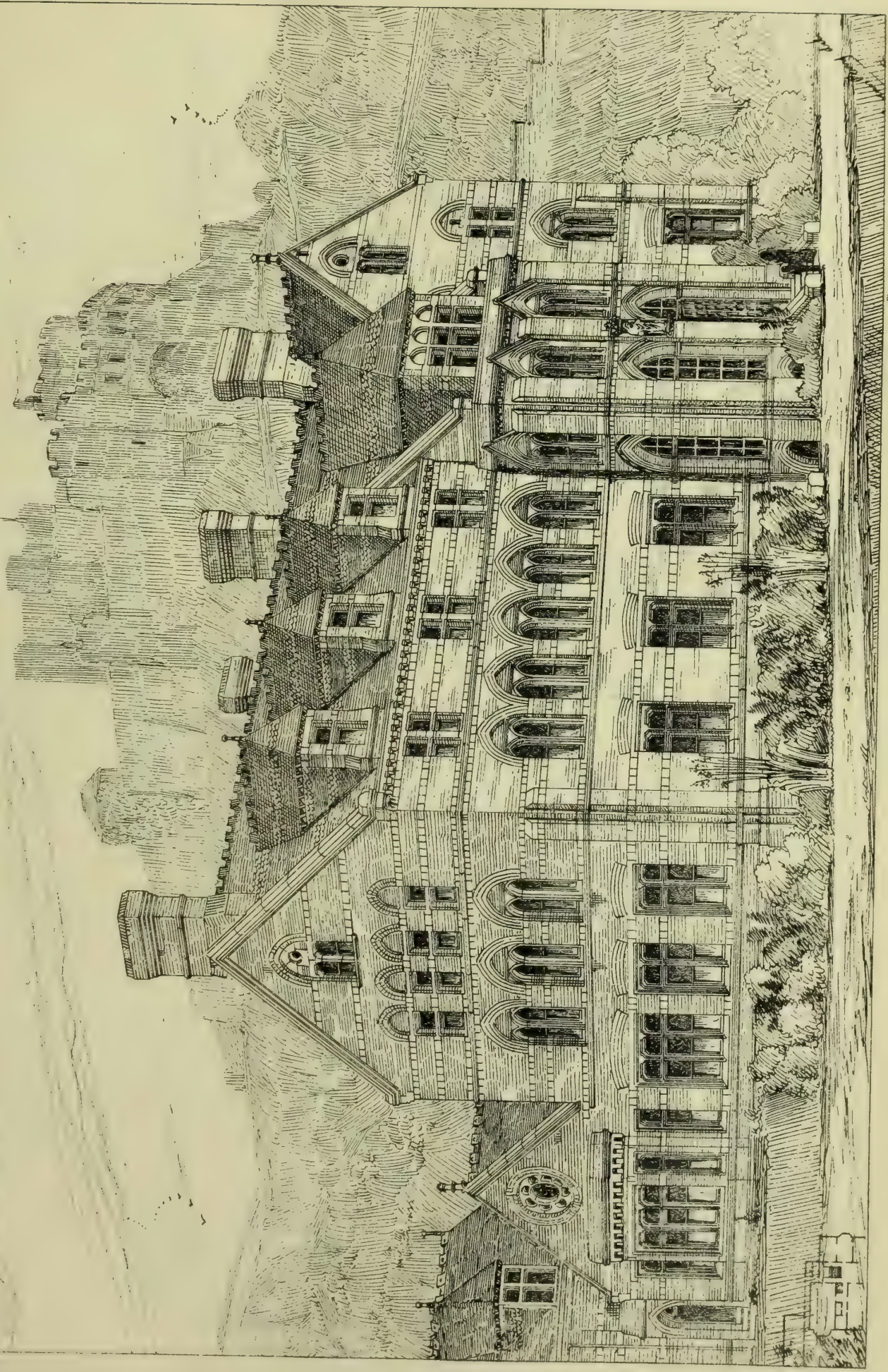






THE BUILDING NEWS SEP. 11. 1874.

**RESIDENCE AND SCHOOL, CASTLE MOUNT, DOVER**  
**J. TAVENOR PERRY & J. TREADWAY HANSON ARCHITECTS**



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# THE CATHEDRAL CHURCH OF ST. DAVID.

By the Rev. MACKENZIE E. C. WALCOTT, B.D., F.S.A., Præcentor of Chichester.

TO the kindness of the Rev. James Allen, Chancellor of the Cathedral, I am indebted for permission to make the following extracts from the unpublished statutes of the Church of St. David, which will be found, I think, to be of interest. I shall never forget my view of the building, with its rich and varied tints, recently restored, with the exception of some extensive portions of its eastern end, contrasting so vividly with the ruins of the Bishop's palace and the College of St. Mary, which, with the exception of the East Gate, flanked by two towers, are the only remains of what was once a magnificent close, encircled by a precinct wall, and filled with capitular houses. A map, by Lord, in the library of the Society of Antiquaries, enables us even now to reproduce their position. On the north side of the Cathedral, over the west side of the College Cloister, stood the library, under the shadow of St. Mary's tower; north-westward of the Cathedral a road ran in the direction of the North-west Gate; to the southward of it were the houses of the Prebendary of St. Nicholas, and the Treasurer; and northward, the Archdeacon of Cardigan; at this point it was crossed at right angles by a road leading from Benning's, or North Gate, to the Palace; and then, on the opposite side, was flanked by the houses of the Archdeacons of St. David's and Brecon on the south, and by the Chancellor's residence on the north. St. Patrick's Gate stood on the south side of the close, facing the Palace; between it and the latter was the house of the Archdeacon of Carmarthen, westward, and those of the Præcentor and the Prebendary of Llandewis on the east. Such a noble and complete group of residentiary houses was without parallel.

The peculiarities in the position, structure, and arrangement still remaining are many. The site, so remote from the world, reminds us of the Scottish Whitherne. Lincoln alone, among secular cathedrals, has a cloister on the north side; but there it abuts upon the choir and not on the nave. The armorial ceiling of the choir had only one like it at Aberdeen; the position of the chapter-house above a sacristy, and below a treasury on the east side of the north wing of the transept, can be compared only with that of Chichester, which stands on the east side of the south arm of the transept, above a sacristy, and in connection with a treasury chamber beyond it. The seats in the windows remind the observer of similar accommodation in the hall of Winchester College, but here they must have served as places of retirement for canons who wished to discuss some matter in a whisper *submissa voce*; at Valle Crucis Abbey one of the three portals of the chapter-house has been walled off to provide a little room with the same view. In the north wing of the transept there are in the west wall some remarkable instances of three periods of reconstruction, embracing a recess, a doorway, and a deep chasm; the only probable suggestion is, that it may have served as a laver for washing corporals, as at Lincoln and Salisbury, and also as the *fossum pavimento*, mentioned by Lyndwood, a kind of sink for the reception of the ashes of portions of sacred furniture, which had become worn out and, according to Canon Law, in consequence burned.

The rood-loft is double, the outer compartment is occupied by places for tombs, somewhat resembling the arrangement in the east wall of the Galilee of Durham; whilst in the eastern bay, or screen proper, there are two lateral passages north and south, with aumbries for books or mortar lights, and opening on a vacant space on either side, inside the great piers, which was probably filled by a wooden staircase, giving access for the Gospeller and Epistoler to the loft. There can be no doubt that in other places where the structural staircases are extremely narrow, such additional accommodation must have been needed when the officiating clergy were bulky men. There was a double rood-screen also at Durham, Canterbury, St. Alban's, and it is be-

lieved at Malmesbury. As at St. Gall, that to the west carried the rood; the one on the east held the Gospel ambon. It was, in fact, a kind of permanent Lent veil which ordinarily hung in this position. There is one at Oberwesel. There were no doubt additional and external means of access provided beyond the narrow constructional stairs, one for ascent, and the other for descent (Martene I., 136) found usually in screens. At Brecon the great piers of the nave are pierced for this purpose.

The following entry points to the traditionary position of Epistoler and Gospeller:—

"6. Mr. Blethyn, on Sunday, iiii<sup>th</sup> of November, 1571. He read the stile of the booke of articles after the Gospell, standing at the east end of the Tombe where the pistell and Gospell be read." This tomb still retains its central position.

The uses of Salisbury and Bangor require that, except only on certain days, the Epistle should be read "ad gradum chori," instead of in the rood-loft, and that of Hereford prescribes the reading of the Gospel by the deacon, *super superiore gradum*; and the Gradual and the Alleluia *super lectresium in medio chori*, and the Epistle by the sub-deacon, *super lectresium ad gradum chori*. At Durham the brass lectern for reading the Epistle and Gospel was placed at the north end of the high altar, whereas at Lyons and Vienne, Martene tells us the Gospel was read in the lower part of the choir, but, like the Epistle, in the ambo at Rheims, Cambrai, Tours, Rouen, Sens, Chalons, Laon, Soissons, Noyon, Amiens, Beauvais, Senlis, Orleans, Chartres, Meaux, Tournay, Bayeux, and St. Denis ("De Antiq. Eccles., Rit." I., 135).

In the Church of France the Gospel and Epistle in masses for the dead were not read in the pulpit or rood-loft, but *juxta altare super aquilam*. (Durandus, Lib. IV., fo. xlviii., b.) In the "Gemma Animæ," which gives the use of Germany, it is said that by an innovation the deacon read the Gospel northward instead of southward; but still his place was "in alto loco," the ambon (c. xiv. xvi.), into which he carried his book. Micrologus mentions the fact that when a priest read the Gospel it was "ad altare" (not, as a deacon did, in the pulpit or ambon), and also "ad sinistram cornu altaris" (c. ix.) At Aberdeen there was *magnum lettron cum iv. candelabris æreis juxta magnum altare* ("Reg. Aberdeen," T. 168). In 1616, at Chichester, the vergers attended with his verge at the Epistle and Gospel.

A mortice now existing in the upper step before the altar, like one at Wouldham, Kent, was no doubt made for the insertion of the processional cross. The socket for one is still visible in the chapter-house of Wells. Rupert, of Deutz, says that the Gospel was read *ad lectricium*, but on festivals in *loco eminentiori*. (Cap. xxxvi.) The ligneus gradus and pulpitem are used as synonymous terms by Amalarius, of Treves (Lib. III., c. xvii.), and the Gospel is said to be read in a tribunal or higher place (c. xviii.) than that used by the Epistolar. We know that at Chichester the processional "cross was carried before the Gospel when it was read in the pulpit," by the Statutes of 1127; and a similar socket is mentioned by Gostling, who says, at Canterbury, that "it was thought proper to remove two steps which distinguish the west end of the choir from the presbyterium or chancel, and place them 3ft or 4ft. more eastward. These steps reach from side to side in the choir, and the middle stone of the lower one has a semicircular projection with a square hole in it, now filled up, which seems designed for the reception of the foot of a large crucifix." (Ch. xlv., p. 256.)

The Shrine of St. David, on the north side of the choir, is in an anomalous position, which had its only counterpart at Whitherne.

At the upper end of the choir there is an open screen pierced with a door frame crossing it, between the throne (which has collateral seats for chaplains, as at Hereford) and the north-east stall, forming the whole space into a cage-like form.

Lyndwood thus defines the term "cancellus" (choir screen): "Est interstitium inter propugnacula murorum quale est quod claudit chorum a navi ecclesiæ" (Lib. I., tit. 10, p. 53); but Durandus distinctly mentions a presbytery screen: "Cancelli quibus altare a choro dividitur" (Lib. I., co. vi.), and traces the choir-veil from the primitive custom of a peribolus, i.e., *paries qui circuit chorum*, non elevatur nisi ad appositionem chori quod adhuc in quibusdam ecclesiis observatur (C. xliii.) Veruntamen hoc tempore

(13 century) quasi communiter suspenditur sive interponitur velum aut murus inter clerum et populum.

In St. Alban's a screen at the extremity of the stalls parted off the sanctuary from the choir, and the end of the moulded beam still remains in the centre of the pier on the south side. At Malmesbury, Dorchester, and St. Gall, a screen also appears to have stood in the corresponding place. As a slight indication of a somewhat similar severance of the sanctuary in a parish-church, I may point to the remarkable brackets on either side of the altar-step at Rowlstone, which, when projected from the wall, form a kind of screen, leaving a passage for the celebrant to approach. A still nearer approach to certainty lies in the rubric of Bangor requiring the taper-bearers and others to approach the acolyte, "ad ostium presbyterii," and the tapers to be set down "ad gradum altaris."

The next entry brings us to a position immediately before the high altar. The slab upon the floor retains its crosses and *sigillum sepulchri* intact.

1259. Solent luminaria hactenus haberi in ecclesia Menevensi in forma subscripta, viz., in Festo Duplici xiv. cerei, in festo ix. Lectionum vii. cerei, in profestis diebus iii. cerei, ad Magnum Altare ardentem, singulis cereis singulas libras cereæ continentibus.

Contra Pascha magnus cereus lx. libras cereæ continens, et ij mortarii cum cepo continue de nocte ardentem per totum annum.

De cætero ij sint lampades coram magno Altari, una cum oleo coram Cruce, pendentes, quæ per horas majores Canonicas accendantur.

At Lincoln seven tapers burned in the brazen chandelier on great feasts; seven tapers stood on the altar, and two in chandeliers on the floor, which were carried by the boys at proper times; one on the chandelier next the altar was alight both day and night; and at matins, vespers, compline, and mass, there was a taper upon the horn of the altar on the north side. Becon mentions the priest blowing out his candle when mass was concluded. At Chichester seven tapers were lighted above the High Altar on feasts of chief dignity, and on the rood-beam eight, and two on the altar steps, and two in the little chandeliers carried before the priest when he left the altar; two at nocturns burned on the chandelier in the midst of the choir, and one outside the choir on the steps leading to the Sacristy. On feasts of the lesser rank there were five lights at all day and night offices; and three altar lights at mass on festivals of the lowest dignity and on ferial days.

Above the high altar of St. David's, a small shrine, perhaps containing a portion of the "True Cross," may have been set on chief festivals; and in the rubric of 1259, we find a reference to the Cross connected with this altar. To mark the position of this relic, possibly the cross inserted into a remarkable aperture may have been added, for there are no signs of a "closure," which would have appeared had it been intended for reservation, as in the case of aumbries, as at Hythe and other places, found over an altar. The orifice at the back of the altar may have also served as a channel for the transmission of the sound of a service said in the eastern space, which there can be little doubt was devoted to some very special use.

Scarfontani says: "Si Sacristia vel tribuna in muro communi versus Altare majus habeat fenestram vel portam in ecclesia respondentem, ex quibus apertis populus bene audire valeat divinas preces, licitum erit canonicis, etiam absque licentia episcopi divinum officium explere in eadem tribuna vel sacristia, exceptis diebus festis." (Lib. II., tit. ii., p. 79.)

This corresponding space may have served to keep the richer reliquaries as a principal sacristy or treasure house.

On the eastern side, the seat in the wall, the five crosses, probably consecration-crosses, removed at the reconstruction of the eastern arm of the church, the converging open windows and diagonal orifices in Vaughan's Chapel, all point to some very sacred object; and it will be remembered that at Winchester the Feretory behind the high altar occupies a similar position of equal size, and contains an outer arch which opened as the Holy Hole, the receptacle of relics and small shrines.

A church was "not reconsecrated if the whole church, or the greater part of it, had fallen to the ground at the same time and was repaired entirely with the original stones. For the consecration of



a church consisteth mainly in the exterior unctions and in the conjunction and arrangement of the stones." (Durandus, lib. I., fo. xxii., b.) The crosses which were necessarily removed in the reconstruction may well have been preserved in this sacred position. It is possible that the bishop may have occupied the wall chair, and that it was set here in rivalry to the patriarchal throne of Canterbury, which stood between the altar and Trinity Chapel. The primate sat in it at Mass until before the consecration, when he went down to the high altar. It must be observed that the diagonal loops command side views of the altars in the presbytery aisles, and the northern oblong looked towards the Lady Altar; the corresponding aperture being merely for purposes of light or symmetry, and apparently following some local tradition. John Ray speaks of "Bishop Vaughan sitting where he had windows so contrived into St. Mary's Chapel behind, that he might see five masses said together at five several altars." In the life of St. Elphege, Osborn tells us that the archbishop, when about to celebrate at the high altar used, to withdraw himself apart into the sacristy, and there, whilst the joyous sounds of hymns arose, he heard private mass sung, and so, full of devotion, went in robes of white, mitred, and wearing his pall, up to the high altar. (Ang. Sac. I., 130.)

At Aberdeen, below S. Duthac's altar, there was a sedile sive stallum ante altare, on which books were laid. (Registr. Aberd., i., 233.) At St. Mary's altar there were sedilia and a bench for the clerk assisting (199). At St. Alban's there is a deep recess, or a seat at the back of the reredos facing the shrine. The only other probable suggestion which can be made is that it may have been a ridstool, or chair of sanctuary, like those of York, Hexham, and Beverley.

In the Capuchin convent at Venice the altar is commanded by some loops from the sacristies on the south; sometimes a monk may be seen attending to the service through them, whilst at other times the sacristan is on the watch to signal the bellringers in the tower.

We find sometimes in a sacristy, as at Beaulieu, Pluscardine, and Christchurch, Hants, or at Britford and Horsham, orifices in the wall slanting in the direction of the high altar, so that the taper bearers could watch for the time to bring in the Gospel lights, and the thuriblers be ready to kindle the charcoal in the censers. At St. Alban's the former made their preparation in the Feretory, and passed through the lateral doors of the Reredos.

The most noticeable Rubric is the following—

§ 8. Quod Canonici chorum non ingrediantur ad ecclesiasticum officium celebrandum nec Capitulum ad tractatum habendum absque habitu sibi competenti secundum diversa tempora, viz. Superpelliceo, capa nigra, et amicia honesta in hyeme, in æstate vero superpelliceo et amicia sine capa (At St. Paul's they wore a black cope and surplice in winter, and in summer albs.) Quilibet Vicariorum singulis diebus intersit horis IV Canonici viz. Matutinis, hora Prima, magna Missa, et Vesperis. Chorum non ingrediantur sine habitu sibi competenti viz. Superpelliceo et capa nigra in hyeme, in æstate superpelliceo sine capa: nudis pedibus v. tibis in choro in die non compareant.

At St. Paul's, in winter nights, vicars wore almucia simplicia de panno nigro ultra colli medium protensa; in 1369 the minor canons wore almucias de nigris pellicibus Calabre nuncupatis et furratis instead of the cloth almuce, and surplices. The canons' habit was a surplice and black cope of moderate length. At Lincoln, the grey amice, a surplice, and a cope of black linen cloth formed the canonical habit.

Note here there are Canonici Priores, Canonici Minores, and Canonici Parvi, making three classes of canons: the two latter must not be confounded with the Minores Canonici or Parvi Prebendarii of St. Paul's and Hereford, who had the privilege of representing the greater canons at the altar, as vicars were their substitutes in the vacant stalls.

The following injunctions afford us an insight into the arrangement of a choir.

1285. College of Llandewy Brevi.

Talis sit statio, in prima parte occidentalis chori versus Navem ecclesiæ a dextris decanus, scil. Episcopus, et iij Canonici Sacerdotes et in sinistris præcentor et ij Canonici in Sacerdotali ordine constituti. In ultima parte orientali Chori versus Altare in parte australi ij canonici diaconi, et ij canonici diaconi in parte boreali similiter collocentur. In medio chori hinc inde stent Canonici Subdiaconalis ordinis et item vicarii

Sacerdotes a dextris et a sinistris. In II<sup>o</sup> vero gradu subtus stent vicarii diaconi et subdiaconi et custodes altaris et allocentur gradatim juxta gradus suos. In III<sup>a</sup> forma pueros et queristros præcipimus collocari.

At St. Paul's the upper stalls were allotted as usual to the dignitaries and canons; we find mention, also, of "clerici de medio gradu (c. 48) clerici de superiori gradu et de ij<sup>a</sup> forma ex utraque parte chori (Stat. c. 53) Majores included all in holy orders—Subdiaconi et diaconiet alii majores secundum suos ordines legunt lectiones (c. 40) On Sundays the lessons were read by pueri de primo gradu, et de gradu secundo. The Laudable Customs of Hereford furnishes us with fuller information. In tertiam formam nullus accedat nisi Canonici vel Sacerdos; secundam formam Diaconi vel Subdiaconi vicarii; primam formam teneant omnes inferiorum ordinum.

At Salisbury the rule was, in medio (of the upper stalls) stant Canonici dignitate (of installation) priores; deinde Presbyteri et Diaconi ad modum qui, ætate et moribus exigentibus, in superiori gradu tollerantur ex dispensatione.

In Secunda forma priores habeantur Minores Canonici (deacons), deinde Diaconi, postea ceteri clerici (subdeacons).

In Prima Forma priores habeantur, Canonici Parvi (those in lesser orders), deinde Parvi secundum ætatis exigentiam.

The superior gradus at Hereford and Salisbury and at Chichester the Priests' Stalls were called the Third Form; the Medius Gradus being the Second Form.

The preceding observations will have the effect which I designed if they tend to a conservative preservation of the precious remains of the past, and induce others to search into the many unpublished records which are still neglected, but if used would throw some accession of light upon points which are yet full of difficulty and doubt. We have been indebted for a sufficient time to Durand and Ducange, and the indefatigable editorship of Abbé Migne: it would be as well to begin repayment of the debt by a careful research into existing documents at home. I mean not only printed books, but the rich sources of fresh and trustworthy information lying among our manuscripts, which it would require only industry and perseverance even for the most inexperienced antiquary to decipher and read.

## A NEW METHOD OF ISOMETRICAL DRAWING.

THE following is an abstract of a paper read at the late meeting of the British Association at Belfast, by Mr. George Fawcens, North Shields.

Isometrical drawing is supposed to represent a bird's-eye view of objects thrown back or forward at an angle of 30 deg. Right angles are thus extended or foreshortened 30 deg. in a manner somewhat similar to perspective drawing of squares or cubes, the angles of 90 deg. being thus represented isometrically by angles of 60 deg. or 120 deg., and a square plane being drawn in a lozenge or diamond shape. In order to draw more readily lines intersecting each other at angles of 120 deg. and 60 deg., it is proposed to use equilateral-triangular-shaped drawing boards with the ordinary T square applied to the edges of the three sides. In an isometrical drawing these three sides will give lines corresponding in length, breadth, and height or depth. To draw a circle isometrically some simple methods are proposed; the circle drawn isometrically appears to be expanded or contracted to an elliptical or oval-shaped form, as is at once seen by cutting a cylinder or tube at an angle of 30 deg. It has been found that after setting off and squaring up on the  $\Delta$  drawing-board the two diameters of a circle, they are inclosed in a lozenge or isometrical square, and that the obtuse apex of this lozenge gives the centre for the drawing of the arc of a circle corresponding to the curve of the circumference of the minor axis between the points where the diameters of the circle touch the lozenge, the radius of which is given by the distance from the outer apex to these points, and the half of the minor axis gives the radius for completing the circle from these points by describing the end curves of the major axis of the ellipse of an isometrical circle, or these curves may be drawn freely by hand or with templates. To draw any other angles more or less right angles, a lozenge-shaped protractor is proposed. In this the lozenge

is divided by two diameters parallel to the sides, into four isometrical squares; of these the outer corners are divided for the angles of 45 deg., the outer sides of these squares are divided for divisions of 15 deg. each; these again subdivided into three divisions of 5 deg. each; these again minutely divided into five equal parts corresponding each to a degree. This protractor gives at once right and left any required angle from the centre of the diameter parallel to the sides of the lozenge. For any angle from any base line not parallel to the side of the lozenge, it is only necessary to take a diameter of the lozenge corresponding to the base line, and the required angles are set off from the centre of the diameter right or left. It is supposed that the use of equilateral-triangular copper plates and triangular blocks of boxwood will greatly facilitate the application of isometrical drawing to copperplate and woodcut engravings.

## BUILDING IN BOMBAY.

NEWS comes from India of the death of the Hon. Narayen Wassodeo, a native statesman of great promise, who was killed by the falling-in of his residence at Malabar Hill, Bombay, on the 12th ult. The house fell in without a moment's warning, although to outward appearance it was as safe as massive beams and solid walls could make it. But the "beams" (according to the *Times of India*) consisted of planks surrounding a core of chunam, and the walls were composed of badly-burnt, half-rotten bricks, and bad mortar. The whole building, though costing, it is said, four lacs of rupees (£48,000) was disgracefully scamped, and the only wonder is that it stood so long. When such is found to have been the state of affairs with regard to a palatial edifice which cost a fortune to build, what may not be surmised as to the condition of the generality of the houses in Bombay? The fall of a house is no new thing in Bombay: it is, indeed, rather a matter of course that houses should fall; but usually some warning is given, the residents are able to withdraw, and as no loss of life occurs, little or no notice is taken of such events. In 1867, when the necessity of passing a Building Act was urged upon the authorities, it was estimated that fully one-tenth of the houses in the town were in a dangerous condition, and that the proportion has not become less since that period is evidenced by the fact that every monsoon the inspectors under the Building Department of the Municipality are obliged to interfere in numbers of cases in the Native Town, and compel the families to quit houses which it is necessary to pull down that they may not fall. Bad materials, badly put together, make the dwellings of numbers of the population as dangerous, during the drenching rains of a heavy monsoon, as the casemates of a fortress undergoing an ordinary bombardment. The builders who "run-up" the Bombay houses are, for the most part, profoundly ignorant of the art of building—as ignorant, it is thought in India, as the common sort of builders who run up the lath-and-plaster houses of new quarters in London. But while the London masonry confines his ambition, as a rule, to the construction of houses of one or two stories, with light slate roofs, his Bombay cousin piles Pelion upon Ossa, and thinks nothing of putting five stories upon foundations that would find two sufficient, placing over all a roof of porous tiles, four deep, which, when saturated with water, would crush stronger walls than he would know how to fashion. The genius for "scamping" which is so strongly developed in both London and Bombay is shackled by a Building Act in the former city; the short-sighted jealousy of the landlords of the latter has left them without even that protection from the ignorance and rascality of the lower class of builders there. It is satisfactory to know, however, that Mr. Walton, the Executive Engineer to the Municipality, and Mr. David E. Gostling, F.R.I.B.A., an architect and civil engineer practising in Bombay, are turning their attention to the subject, and that a draft Bill has been prepared, which, it is now believed, will pass the Legislative Council—on the principle of locking the stable door after one of the steeds has been stolen. Meanwhile, a survey of all the Government buildings has been made, and engineers and building-inspectors have been busily occupied in seeing to the security of both life and property.

A new chancel and north transept, which have been added to the church of St. Paul, Staleybridge, were consecrated on Saturday.



## ARCHITECTURAL ASSOCIATION ANNUAL EXCURSION.

## SECOND WEEK.

**A**PERUSAL of our account of the work undertaken during the first week will convince any reader that such of the members as proposed continuing the excursion were grateful for the rest afforded by Sunday. Many left at the end of the first week, but on the other hand the party was reinforced to a certain extent by the arrival of others whose arrangements allowed of their joining only in the second week's work.

## FIRST DAY.

A journey of about 70 miles by railway brought the party within view of the ancient city of Soissons. The Abbey of St. Jean des Vignes first claimed attention. Little exists of the conventual church beyond the west front, with its towers and spires, all the rest having been destroyed at the time of the First Revolution. The carving of the western portal is particularly fine. Of the domestic portion, the Domus Conversorum is the most noticeable, Mr. Sharp remarking that it was the best he had ever seen.

The Cathedral is a magnificent early structure, and generally considered the finest-proportioned of any in France. The south transept is extremely curious, having apsidal end with ambulatory, the whole transept bearing a striking similarity to the Beckett's crown at Canterbury. Here, too, the restorers are at work, for cracks have shown themselves in the vaulting, and it has therefore been thought necessary to take down the transept to the level of the clerestory cills; but the diocesan architect, who was in attendance, explained that each stone would be marked in order to insure its faithful restoration. Scaffolding being up, several members joined in measuring the transept, sections of the mouldings being taken by cymagraph. Good early stained glass was visible in clerestory of apse, and surrounding chapels.

The Church of St. Leger was also visited. It is a fine Transitional building, with fine crypt, cloisters, and chapter-house still remaining, the latter now in use as a school. Leading to the crypt are evidences of a Roman church having once existed here.

Before leaving Soissons for Rheims, the same evening a visit was made to the desecrated church of St. Pierre, an interesting Transitional structure, containing very good carved caps, and now used as a storehouse for empty barrels.

## SECOND DAY.

The whole of Tuesday was spent at Rheims, inspecting the Cathedral and Conventual Church of St. Remi.

The cathedral is a very imposing structure, and seen from the west, impresses one with its unusual richness of detail. The three western portals, and that to the north transept, are almost inconceivably sumptuous. The interior is, however, of a much plainer and bolder character. The nave arcade is uncommonly high, and from that circumstance, and the fact of the ritual choir extending three bays down the nave, seems much shorter than it really is. Clerestory windows are mostly filled with ancient stained glass of so opaque a character that the interior has a very sombre appearance. The church is rich in old tapestry, the walls of the aisles being entirely covered with it. An interesting clock is to be found in the north transept, reputed the oldest working clock in existence.

To the south of the cathedral stands the Archbishop's Palace, attached to which is a small but fine twelfth-century chapel, with crypt underneath. The large hall of the palace is also ancient, and has an open barrel roof and carved fireplace worth notice. Between this hall and the south aisle of cathedral new work is being executed in a very heavy style and bad taste.

The Abbey Church of St. Remi was shown to the visitors by the architect and curé of the church, and much amusement was afforded by the endeavours of a rival architect to confute the theories of the official architect as to the history of its various alterations. Of Romanesque foundation, subsequent additions have almost completely changed the original character of the building. Thirty years ago the nave was roofless and without vaulting, but all this and the west front, which suffered during the Revolution of 1793, have since been restored—very creditably, considering the time at which the restoration took place.

The church abounds in excellent carving, many of the capitals bearing a close resemblance to some in the choir of Canterbury. In the centre of apse behind high altar stands a Renaissance shrine to S. Remigius, who is buried here. Opening out of the ambulatory through triple arches, a beautiful lady chapel extends further eastward. The sacristy is wealthy in ancient vestments, Limoges enamels, and tapestry depicting scenes in the life of S. Remi. The western tower contains a good carillon peal of bells.

Adjoining the Church of St. Remi, towards the north, is the Hôtel Dieu, an hospital erected on the site of portions of the domestic offices, the ancient chapter-house being incorporated with it, and now used as refectory for the Sisters in charge. The carved caps of entrance to Chapter-house are in a good state of preservation, and were greatly admired. Outside the city an old Roman triumphal triple archway still exists in good condition, with carved caps and fluted columns.

## THIRD DAY.

Wednesday was spent at Laon, where the Cathedral and two smaller Churches occupied the attention of members.

The cathedral stands on a high hill, approached from the railway by a flight of steps far more formidable, even, than those at Whitby, and is in course of restoration, so called, the jointing of stonework in the interior being carried out in black mortar with such emphasis that the vastness of the edifice is much reduced in appearance. The same thing has been done lately with a like result at Heckington Church, in Lincolnshire. Each aisle of the nave of the Cathedral is lined with small chapels, having Renaissance screens, which gives much character to the interior. An unusual feature is the square east end, which, however, is a little later than the surrounding work, and, after all, appears to have been composed from an earlier apse of contemporaneous date with the rest of the choir. This is certain on examining the caps at the east, which have curved abaci. A document recently found fixes date of the original choir at 1180. At the east end of the church a Greek painting of St. Veronica's handkerchief is exhibited, presented to the nuns of the town in the tenth century. The official architect undertook a special journey from Bayonne for the purpose of pointing out the features of the edifice under his charge, and had caused to be erected a specimen of the wrought-iron roofing with which the nave is at present covered.

The Church of the Templars, a small early Transitional building with apse and octagonal nave and porch, the latter having a gallery over opening into nave, was next seen, and some little distance from the Cathedral is the Church of St. Martin, the architecture of which was disappointing. In the evening the party returned to Rheims.

## FOURTH DAY.

A journey of about two hours brought the members to Chalons early on Thursday morning, and the Cathedral was at once visited. It is in course of restoration, and is a very good example of Advanced Geometrical architecture with additions of latter date, including a Classical west front. The aisle and clerestory windows are of four lights, with traceried heads, reminding one of the aisle windows at Grantham, and the cathedral contains good stained glass. An organ-case in the west gallery is perhaps the best piece of modern woodwork seen during the excursion.

The Church of St. Alpin is also interesting—a small cross church of early foundation, with central tower, and contains remains of good glass.

The Church of Notre Dame is an important building, with remarkably fine east end and chapels round apse; it is also rich in Transitional carving, but the interior is much disfigured by injudicious restoration, the black mortar jointing reappearing at this church. The chimes here were set to work for the benefit of the visitors, and gave great satisfaction.

## FIFTH DAY.

From Paris again the party left for Rouen, in charge of Mr. Penrose, Mr. Sharpe being indisposed—and no wonder, considering the labours he had previously undergone. The Church of St. Ouen was taken first. Its west front has recently been entirely refaced, after a lifeless fashion. The pinnacles and buttresses are very striking, but the architecture throughout is very wiry in comparison with previous examples.

The interior is very open, the floor being kept clear of seats. Good late glass remains, and traces of frescoes are yet visible in spandrels of choir arches.

The Church of St. Maclou is another Flamboyant structure well deserving of a visit. Apse and central lantern good, and a fine stone circular staircase at west-end, leading to organ-loft.

The Cathedral is a fine open thirteenth-century church, with extensive additions of later date; the clerestory having very good four-light geometrical windows. The beautiful lady chapel contains a good Renaissance tomb, but the altar-piece is out of character with the building. The west front is very striking, being flanked by towers of different dates, but both very fine of their respective periods. The ornamentation of the entire front is indescribably delicate. The central tower is also very fine, but its beauty is much marred by the addition of a hideous spire of open iron-work.

The remainder of the day was spent in visiting other churches in the city, and the civic buildings of note. The town is extremely picturesque, being full of remarkably fine half-timbered dwellings.

In the evening the members had their final dinner, there being present 32 persons, including Mr. Fergusson, with whom the party had fallen in on their way to the cathedral, Mr. Penrose occupying the chair in the absence of Mr. Sharpe. After dinner the health of Mr. Sharpe was proposed and drunk with great enthusiasm, and other toasts followed, including a warm acknowledgment to Messrs. Clarkson and Hayes for their incessant labours as secretaries, and votes of thanks to the Minister of the Interior, the church dignitaries, and others who had rendered facilities to the members of the Association in visiting the buildings comprised in the excursion programme. During the evening a discussion took place relative to next year's excursion, some being in favour of a tour in the South of France, whilst others preferred a visit to the Yorkshire abbeys; but all seemed content to leave the eventual selection in Mr. Sharpe's hands.

## ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS.

**T**HE fifth meeting in connection with the Midland branch of this Society was held on the 29th ult. at Coventry, Mr. Purnell, C.E., Surveyor to the Coventry Urban Sanitary Authority, in the chair (in the absence of the President, Mr. Lewis Angell, C.E.). After a short business meeting in St. Mary's Hall, the company, having, under the guidance of Mr. Purnell, paid a visit to the silk-factory of Mr. T. Stevens, and the watch-factory of Mr. Wallen, were conveyed to the sewage works at Whitley, where they were met by Mr. Mellis, C.E., Engineer to the General Sewage Manure Company, and Mr. Collington, the manager of the Coventry Works. The effluent water was seen under very unfavourable circumstances, owing to the violent storms which had occurred during the morning, and in consequence of which the outflowing water was mixed with a considerable quantity of mud, and presented a very dark appearance, which tended to unfavourably impress visitors as to the efficacy of the process. The company were then driven to the waterworks at Spon-end, where the Diamond Boring Company are engaged in sinking a shaft for a further supply of water. While watching the action of the machinery, what might have proved a serious accident occurred. The large wheel over which the driving-band from the fly-wheel passes suddenly broke in two, one half falling with a terrible crash on the platform upon which the visitors were standing, and coming so near to one gentleman that it tore a large rent in a coat which he was carrying upon his arm. The process adopted by the Diamond Boring Company was explained in detail, and Mr. Purnell, the City Surveyor, then read a paper describing the waterworks of the City of Coventry, from which it appeared that the water-supply of the city is derived from four artesian wells, sunk in the New Red Sandstone. Two of these wells are 75ft. deep, one 195ft., and one 300ft., the strata passed through being alternate beds of sandstone and red marl. The total quantity obtained from the four borings at the present time is about 600,000 gallons per day, in addition to 60,000 gallons from two surface springs, and about 60,000 gallons per day from a small brook. The



number of houses supplied at the present time is 8,010, the number of water-closets being 4,300, no extra charge being made for these unless they are on the first floor. The average annual quantity of water for the last ten years has been 2.35 million gallons. The whole of the works were designed and carried out by Mr. Thomas Hawkesley, C.E.—Mr. Pritchard, Borough Engineer of Warwick, then read a portion of the returns he had obtained, in connection with the Hasleley water scheme, from a large number of towns, as to the quantity of water supplied per head of the population, Coventry standing at 19, Leamington 22, Warwick 25, and other towns, some sinking as low as 6, while others amounted to 70 gallons per day.—The visitors having returned to St. Mary's Hall, a paper was read by Mr. Mellis, C.E., on the operations which the General Sewage and Manure Company are now carrying out in reference to the sewage of Coventry. Mr. Mellis deprecated the want of unity on the part of the sanitary engineers as to the solution of the sewage problem, and said one reason why more progress had not been made was the fact that the sewage question had been constituted into a commercial one, with the idea that large fortunes were to be made directly from the sale of sewage manures. This had caused much disappointment. Another reason why more progress had not been made was that rival schemes were pitted against each other, the promoters of them entirely forgetting or losing sight of the fact that each locality and town must be dealt with on its own peculiar circumstances, and, that however well any one plan might answer in one place, it would be an entire failure, perhaps, in another. Last, though not least, amateur chemists and amateur engineers had done more to retard matters than any one else. The fine-weather average flow of sewage from Coventry, which has a population of 40,000, amounted to 18,000,000 gallons in twenty-four hours. The first process employed by the Company is that of mechanical straining of the sewage; the second is the admixture of the principal chemicals; the third is the admixture of a small quantity of milk of lime; the fourth is the precipitation of the solid matter; and the fifth is the drying of the sludge into an agricultural manure. The sewage of Coventry yields about 5 tons of dry manure daily, and this is chemically valued at £3 per ton; and Mr. Mellis said he was quite sure it possessed valuable fertilising properties. As the Coventry works had only been in operation four months, it would be premature to produce any statistics as to the cost of working; but Mr. Mellis said that if all the manure finds a market at its stated value, the returns would be larger than the expenditure. However this might be, local authorities should not rely too much upon returns, but first seek to deal with their sewage as they did with any other portion of the municipal machinery, such as police, roads, sewers, &c., &c., and then endeavour to make as much as possible out of its products. Mr. Mellis remarked that the large quantity of sludge with which they were overburdened at Coventry was due to the fact that the drying machinery had been out of work more or less during the last five or six weeks, in order to enable Messrs. Milburn and Co. to erect a new sludge filter, immediately over two of the drying machines, and to make arrangements for new flues, by which the gases arising from the sludge should be burnt instead of escaping into a chimney stack. He anticipated that with Messrs. Milburn's new filter the present machines would dry four-fifths of the sludge, and that the erection of another drying machine and filter, space for which was provided in the buildings, would dry the remainder. Mr. Mellis mentioned, in conclusion, that the Nuneaton Sewage Works had been in the hands of the Company for two years, but the works were now quite inadequate to deal with the large increase in the flow of sewage, through leakage of river and subsoil water into the sewers; and the question that had arisen was merely whether the Company or the Local Board of Health should enlarge them.—In the discussion which followed, Mr. Lewis Angell, the President of the Association, said that he felt bound to say that the works at Coventry, as works, were well adapted for the purpose to which they were devoted, and reflected great credit upon the engineer. The Association welcomed every attempt made to solve the sewage difficulty, but he thought the Company had scarcely been at work long enough to determine the question of the commercial value of the residuum. Speaking from experience, he must say

that the cost of treating sewage by chemical means was very large. Speaking of West Ham (where he is Engineer), he could say that, with a population of 70,000, it had been ascertained that for the chemical treatment of their sewage by one process £14,000 a-year would be required. This was a very large sum to expend upon chemicals; and the most that they were promised was that they might get a result which, if it did not pay, would at least involve them in but little loss. Owing to the many difficulties with which the subject was surrounded, he was of opinion that it ought to be taken up by Government, and recommended that a Commission should be appointed to inquire into the question as to whether defecation was the better principle, or the placing the sewage upon the land. One of the greatest difficulties in connection with the chemical treatment of sewage was the drying of the sludge; and he was of opinion that Milburn's apparatus would prove a failure, as it would not dry ordinary sewage sludge except at a great cost. It had occurred to him whether some absorbent agent could not be discovered and applied, and quicklime had suggested itself as such an agent, which, if applied to the sludge, would absorb the moisture, and promote the drying process, while it would add to the manure a property which to some lands would be very valuable. When in the Potteries, he had found that there was a waste substance—plaster of Paris—and it struck him that the combination of this plaster of Paris with the sludge might effect, to some extent, the desired end. The subject was surrounded with difficulties, and if the borough engineers and surveyors followed the advice which was given to them by one Inspector of the Government, they would be immediately set upon by another. He was more and more convinced, the longer he studied the question, that the sewage must go upon the land.—Mr. Pidcock, the Borough Surveyor of Nottingham, then said, that, as far as he understood it, the Company's system was no new one. He had himself carried out the same principle ten years ago, and it had proved so unsatisfactory that they had three injunctions procured against them because of the impurity of the river, and they had been driven to adopt irrigation. He was surprised no statistics had been adduced, and should have liked to know the cost of the shale used. He had used shale, obtained from Norway at a cost of £5 per ton, which was, of course, a very heavy charge. Then he had tried different kinds of clay, but these had not yielded the results he desired. But after this, the system of treatment of sewage really was identical to that used by Dr. Bird, who was the first to suggest the use of sulphates; for, in all the other modifications, this was the basis. He (Mr. Pidcock) had found that the ferruginous clay was the best and cheapest. He had come to the conclusion that there was no chemical treatment known which would prove successful. He thought that downward filtration, such as had been carried out by Mr. Bailey Denton at Merthyr Tydvil, might do; but, practically, he believed the sewage would have to be put over large areas of land, and irrigation was the real solution of the difficulty. Sewage treated chemically would, after having been poured into the river, sooner or later prove foul.—Mr. Stephens (Borough Engineer of Leicester), Mr. Pritchard (Borough Engineer of Warwick), Mr. Harper (of Merthyr Tydvil), Mr. Wyles, and Mr. Mellis continued the discussion; which having been concluded, the company dined at the Craven Arms Hotel, Mr. Alderman Marriott in the chair, and so terminated the day's proceedings.

#### COMPETITIONS.

**CHEETHAM.**—At a meeting of the Free Libraries Committee of the Council, held the 26th day of August, it was resolved to erect a Free Library at Cheetham, and that Messrs. Clegg & Knowles, Messrs. Speakman & Charlesworth, Messrs. Price and Linklater, and Messrs. Barker and Ellis be asked to submit drawings for the building.

**NEWCASTLE-UNDER-LYME.**—The designs of Messrs. Hay and Oliver, of 15, Great James Street, Bedford-row, have been chosen in the open competition for Board Schools at Newcastle-under-Lyme for 800 children. Messrs. Hay and Oliver have also been successful in the competition for Holbeach Grammar Schools.

The parish-church of Charing, Kent, is now undergoing restoration, at the cost of the Ecclesiastical Commissioners.

## Civil Engineering.

**ABERDEEN.**—On Saturday the Duke of Edinburgh laid the foundation-stone of the new North Pier at Aberdeen. It was recently decided that 500ft. should be added to the length of the pier, making its total extent 2,000ft. Sir John Hawkshaw and Mr. James Abernethy were the consulting engineers, and the whole of the operations are being carried out under the superintendence of the resident engineer, Mr. Dyce Cay. The method proposed for building the outer part of the work is to form the foundation by laying down a concrete mound or platform of considerable width. This platform is proposed to be formed of bags containing each about 100 tons of Portland cement concrete deposited in a liquid state. The deposit of these bags will be effected by the use of a box fitted into a well, and a hopper barge. The box will be capable of containing upwards of 100 tons of concrete, and its bottom will be formed of two doors opening on hinges. The barge will be brought alongside a wharf to be erected in the harbour. The bag will be then fitted into the box and filled with concrete. The barge will subsequently proceed to the end of the pier, and be moored above where the bag is to be deposited. The bottom of the box will be released by the pulling of a trigger, and the bag will then sink to the bottom. This is an invention of Mr. Cay. It is intended to lay down the bags considerably in advance of the building of the upper part of the work, so as to allow them to consolidate before they are built on. This will bring the work up to about the level of low water. From this level to the roadway, a height of about 20ft., the work will be built of concrete deposited in a liquid state in wooden frames, and containing about 600 tons each. Along the north side of the work a parapet, about 9ft. high, is proposed to be carried. It is intended to make it hollow, so as to form a covered way for the use of those who have to pass along the pier in stormy weather.

**THE GREAT WESTERN RAILWAY.**—The work of widening the Great Western Railway, for which powers were obtained during the last session of Parliament, has just been commenced at Acton, Hanwell, and other places between Paddington and West Drayton, to which place it has been resolved to lay two additional lines of rails at once. The work presents many engineering difficulties, but the most important is that which has just been commenced at Hanwell, where the River Brent is spanned by a viaduct 696ft. long and about 50ft. high. The viaduct will consist of twelve arches, eight of which will be 70ft. span and four of 32ft. span, with massive retaining-walls at each end. The height from the ground to the spring of the arches will be exactly 45ft., and thence to the railway level 23ft. The abutments at the base will be 15ft. 6in. thick, and above the plinth 14ft. 6in. The entire structure is being built after the designs of the architect of the original viaduct, and it is calculated that about 7,000,000 bricks will be used in the undertaking.

#### ARCHÆOLOGICAL

**GRÆCO-BUDDHISTIC RUINS IN NORTHERN INDIA.**—The *Times of India* says that the last Punjab Government Gazette contains an interesting report on some Buddhist ruins at Takhti-bai, in the Yusufzai district. In the beginning of the year 1871 a party of Bengal Sappers and Miners, under the command of Sergeant Wilcher, R.E., left for the ruins, which are about eight days' journey from Peshawur. The work of excavating and surveying was carried on uninterruptedly for about three months. The ruins were found to consist principally of a series of temples. One general style of architecture was apparent throughout the ruins. The walls are built of stones quarried on the spot, of irregular shapes. The roofed buildings are of very small size internally; no instances of alternate curved and flat or Egyptian arches were met with. In the largest temple an immense number of idols of various shapes were discovered; they were nearly all dug out of the *débris* with which the floor of the temple was covered to a depth of 8ft. "The platforms on which the idol recesses are built are beautifully enriched with Greek mouldings. In some places the lines of the mouldings are as sharp and defined as though executed but yesterday."



Connected with this temple were a number of cells which had apparently been used to confine prisoners in. The following figures considered worthy of preservation were disinterred from the rubbish on the floor of the temple:—"Forty-six human heads, thirty-five squatting human figures, seventy-five erect human figures, and several frescoes." The results would have been more successful, but the means available were very limited, and the party lost one-half of their number while the work was being executed. In the *BUILDING NEWS* for March 6 last, Vol. XXVI, p. 253, we reported a lecture by Dr. Leitner on the same subject.

**INDIAN ARCHAEOLOGY.**—The *Geographical Magazine* announces that the India Office has resolved to print the account of the recent researches of Mr. Burgess (of Edinburgh) in the Bombay Presidency, together with its accompanying illustrations. The report contains an exhaustive notice of his discoveries at Belgam, Konur, Pattadakal, Aiwali, and Badami, at which latter place are some highly-interesting sculptured caves of the sixth century, a complete delineation of which, with a few casts, would form a valuable illustration of Hindu art and Vaishnava mythology—only to be rivalled by what Ajanta affords of Buddhism. Mr. Burgess has brought home altogether 54 photographs, between 25 and 30 fac-similes and copies of inscriptions, about 40 ground-plans, sections, and other architectural drawings, and 40 sketches of sculpture—of which 20 photographs, nearly all the inscriptions, and 20 sheets of drawings, &c., will appear in the report of his three and a half months' tour.

**LEICESTERSHIRE ARCHITECTURAL AND ARCHAEOLOGICAL SOCIETY.**—A general meeting of this Society was held at Leicester on Tuesday and Wednesday, under the presidency of the Mayor of Leicester. At 11 a.m. a public meeting was held at the Guildhall. After luncheon an examination, under competent guidance, of the chief points of architectural and archaeological interest in the town, and an inspection of the museum, was made. At 8 p.m. the public meeting was held at the Guildhall. Papers were read at both meetings, including one by Jas. Thompson, Esq., Local Secretary of the London Society of Antiquaries, on "The Rolls of the Mayors of Leicester," and one by Thos. North, Esq., on "The Pates of Eye Kettleby and Sysonby." On Wednesday an excursion was made to Syston, Rearsby, Gaddesby, Ashby, Folville, Twyford, Queniborough, and Barkby.

**CAPE COLONY.**—Our correspondent says:—"No decision has been arrived at yet with regard to competition designs for new Houses of Parliament. A discussion took place in the House on the 20th July as to the insufficiency of the amount to provide suitable buildings. A Bill for the construction of 800 miles of new railway, at a cost of over £45,000,000 sterling, has been passed; works to be commenced at once. Another Bill, for the construction of four bridges over the Orange River, has also been passed, to cost in the aggregate about £200,000. The town of Port Elizabeth has obtained a Bill by which it is proposed to construct new waterworks, bringing the supply of water from springs, which deliver about 2,000,000 gallons per day of pure water, at the village of Uitenhage, distant about twenty-five miles from Port Elizabeth. The cost is estimated at £100,000. Uitenhage also contemplates an expenditure upon a town water-supply from the same source. The rise of water in the New Rush Diamond Mine (Diamond Fields territory, or Griqualand West) has become most serious, and work in many claims is stopped.

**POPULATION OF LARGE CITIES.**—A report from the Bureau of Statistics, Washington, gives an account of the population of the various countries of the world. Among other details, it gives the following as the populations of the twenty-five largest cities of the world:—London, 3,254,260; Sutchan (China), 2,000,000; Paris, 1,851,792; Peking, 1,300,000; Tschantschau-fu, 1,000,000; Hangtschau-fu, 1,500,000; Siangtan, 1,000,000; Singnan-fu, 1,000,000; Canton, 1,000,000; New York, 942,292; Tientsin, 900,000; Vienna, 834,284; Berlin, 826,341; Hangkan, 800,000; Tschingtu-fu, 800,000; Calcutta, 794,645; Tokio (Yeddo), 674,477; Philadelphia, 674,022; St. Petersburg, 667,963; Bombay, 644,405; Moscow, 611,970; Constantinople, 600,000; Liverpool, 493,405; and Rio de Janeiro, 490,000.

## Building Intelligence.

### CHURCHES AND CHAPELS.

**BIRMINGHAM.**—The foundation-stone of a new Catholic Apostolic Church, was laid at Birmingham on Saturday. The design of the church has been prepared by Mr. J. A. Chatwin, architect, of Birmingham. The church will include a nave 89ft. long and 30ft. wide; and a baptistery 15ft. 3in. long. Projecting eastwards are a chancel 37ft. 3in. long, and 23ft. wide; side chapel 30ft. long and 18ft. wide; a chasuble-room, and three vestries. The church will be entered by a cloister and porch at the north-west side. There will also be a chapter-house at the west end, 20ft. by 20ft.; total length of the church, 145ft. The nave will be divided from the aisles by arcades of eight arches each. The church will be faced externally with brown bricks, the tracery of the windows being of terra-cotta. The inside of the church will be faced with white bricks with diaper-work and bands of brown bricks, the caps and bases to the pillars and corbels being of terra-cotta. The roof will be supported by arched wooden ribs, the rafters being exposed, and the roof boarded and covered with tiles. The total cost of the church will be about £8,500, but it is intended to build the nave, baptistery, chancel, and vestries first, at a cost of £5,644. Mr. B. N. Smith, of the Crescent, is the builder, and Messrs. Gibbs and Canning, of Tamworth, will execute the terra-cotta work.

**BRIGHTON.**—The new Church of St. Bartholomew, Brighton, was opened on Tuesday last. The church, which is very lofty, has been erected by Messrs. Stenning, contractors, from a design by Mr. G. G. Scott. The total length of the church outside is 180ft., inside 170ft., the breadth being 46ft., and the recesses of the piers, which are placed at distances of 10ft. apart, 6ft., making the distance about 58ft. from wall to wall. The walls rise about 90ft. from the ground to the parapet, and the roof rises to a further height of over 40ft. above the walls. There is no chance to the church at present. The church has been erected of plain picked stock bricks, relieved with bands of Portland stone, and having a moulded and weathered kiln-brick plinth. The entrance in Ann-street is one of the principal external features of the church. Above the doorway is a canopied niche of Portland stone, which will receive a statue of the patron saint. Red kiln bricks in various patterns form diaper work above this, and the large clerestory window, which is 20ft. in diameter, further relieves the view from being a mere mass of brickwork. At the north end internally is a cross, hewn out of chalk, and 20ft. in length, which is transformed into a representation of the Crucifixion by a fresco of our Saviour being executed upon it. The altar is raised twelve steps, and a dossal surmounts it about 3ft. above. The roof is open-timbered, with large laminated principals. Reckoning 6 cubic feet for each person, there will be accommodation for 1,500 persons.

**HOUSTON.**—The foundation-stone of a new parish-church was laid at Houston, N.B., on Saturday last. The new church is expected to cost about £3,000. It will accommodate upwards of 600 sitters, mostly on area floor, there being only one small gallery at the west end of church. The style is Early Gothic, with bold and simple details. A square tower, of nearly 70ft. in height, will be built at the south-west corner, with pointed triplet windows in belfry stage, and battlemented top, terminating with a pointed roof. The contract is being carried out by Mr. Robert Whyte, Glasgow, from the designs of Mr. David Thomson, I.A., of Glasgow.

**KNOWLE.**—On Tuesday the foundation-stone of a new Wesleyan Chapel was laid at Knowle, near Bristol. The designs for its construction are by Messrs. Foster and Wood, Mr. Sommerville being the contractor. The style of architecture will be Gothic, with open roof of pitch-pine, and the material will be Pennant stone, relieved by freestone dressings. There will be a minister's vestry attached to the chapel, which is to be 90ft. by 40ft., and, including a gallery, there will be accommodation for thousand people. A tower will be erected at the north-west corner of the building. The cost of erection is estimated at about £3,000.

**LIVERPOOL.**—The new Old Hebrew Synagogue in Prince's-road, Liverpool, was opened on

Thursday week. The style is described as a "happy union of Gothic and Classic, with Eastern features introduced." The interior plan of the building is a parallelogram, divided into a nave and side aisles. The seats will accommodate 800 persons. At the east end of the nave is placed the sacarium, divided from the nave by an elaborately-ornamented horse-shoe arch. Under this arch stands the magnificent ark, a structure of polished marble, alabaster, and Caen stone, rising from a marble platform to the height of about 25ft. The lower portion up to the main cornice is entirely of variegated marble and veined alabaster, and the cornice and the five domes that finish the structure are of carved Caen stone, which will ultimately be gilded and painted. The materials employed are grey and red brick, with a lavish use of stonework throughout the western portion. The architects for the whole works are Messrs. W. and G. Audsley, Liverpool, and the builders are Messrs. Jones and Sons, Pleasant-street. The cost of the building, exclusive of the interior decoration, which has yet to be done, is £13,000.

**REMOVAL OF TWO OF WREN'S CHURCHES.**—The Ecclesiastical Commissioners, under the provisions of the City Improvements Act, are engaged in making arrangements with the authorities of St. Michael's, Queenhithe, and St. Benet's, Paul's Wharf. There is a singular similarity in the two churches; both are in the gift of the Chapter of St. Paul's, were built in the twelfth century, were burned down in the great fire of 1666, were rebuilt from designs furnished by Sir Christopher Wren, and contain objects of archaeological interest second to none in the City. In the former the parish registers, dating from the first year of the reign of King Edward VI., are preserved, together with a richly-illuminated vellum churchwardens' book, whilst the eastern entrance to the church possesses a doorway richly ornamented with carved fruit and flowers, the work of Grinling Gibbons. The latter is celebrated as the burial-place (the register is preserved) within its walls of Inigo Jones.

**TWESKESBURY.**—Tewkesbury Abbey Church, the nave of which dates from the early part of the twelfth century, will shortly undergo a partial restoration, in anticipation of its thorough restoration at the hands of Sir G. G. Scott, it being proposed to carry out the work in sections. The galleries and lath-and-plaster partitions, together with a huge canopied Corporation "pew," have been already removed, and the organ-gallery, which occupies the position of the old rood-loft, will shortly follow. The ancient carved oak stalls, which are in very good preservation, will be moved to their original position east of the transepts. The pews will also be cleared away, and chairs or open benches substituted.

### BUILDINGS.

**COLCHESTER.**—The new Artillery Barracks, Colchester, are approaching completion. The new buildings are situated between the Cavalry Barracks and the footpath leading to the Buttrick-road. The front facing the field is composed of a centre block of red brick buildings, destined for officers' quarters; on each side of this is a barrack block, and to the south is the canteen. Married soldiers' quarters, guardhouse, gun-sheds, &c., are also provided. Messrs. Everitt and Sons are the contractors, and the total cost of the buildings will be about £60,000.

**EDINBURGH.**—The new police-station for the West End of Edinburgh is expected to be ready for occupation in about a month. The new building has been erected from plans prepared by Mr. R. Morham, junr., City Superintendent. The style of the façade, which is of Hailes stone, with Dunmore dressings, is modelled on the old Scotch architecture. The estimated cost is about £4,000.

**OXTON.**—The local board of Oxtun, Liverpool, have just completed their public offices. The building is in the Italian villa style of architecture, and is built of red bricks, with white stone dressings. The board-room is 30ft. by 20ft., and 10ft. in height. The architect was Mr. Joseph Brattan, and the contractor Mr. Bleakley, builder, Cloughton-road, Birkenhead. The cost has been about £1,630.

**PRESTON INDUSTRIAL INSTITUTE.**—The Mayor of Preston on Thursday last opened the new and extensive shop, workrooms, committee-rooms, showrooms, &c., just completed for the Preston Industrial Institute for the Blind. The



large sale shop, 30ft. by 30ft., fitted up with every requisite, with a counter 32ft. long, made of the choicest pitch-pine, occupies part of the frontage to Glovers-street. It is lighted by two large plate-glass windows, 8ft. 9in. by 8ft. In the rear are rooms for cane-seating, 29ft. by 14ft., brush-room 40ft. by 28ft., with "pan" room 18ft. by 12ft., and apparatus occupying one end. The remaining portion of the frontage is the residence for the saleswomen, and comprise large parlour, kitchen, scullery, and three bedrooms on the first floor. The cellars under the whole of the buildings are roomy, lofty, and well ventilated, and used as workrooms and storerooms. The large "strip" room, 52ft. by 28ft., is in one span. The first floor is approached by two staircases, one for the house portion, committees, and the other for the public in case of meetings, or for educational purposes for the blind. Each staircase leads to the large committee-rooms and secretary's office, and these rooms are so constructed that by removing a sliding partition one large room for public entertainments can be formed with separate entrances. Adjoining are lavatories, cloak, and ante-rooms, &c. The main front is of Longridge stone to the first floor, rich and effective in design. In the centre of the building is provided a "hose," sufficiently long in case of fire to extend to all the main rooms. The total cost has been £3,000, and the money raised at a bazaar held in April, 1872, when the nett proceeds amounted to £3,444. 1s. 9d. The building is heated by "Sewards" hot water apparatus; the works have been carried out by Mr. John Walmsley, of Preston, under the superintendence of Mr. T. H. Myres, A.R.I.B.A. (Messrs. Myres, Vevers, and Myres, Architects, &c.) Preston.

**SANDRINGHAM.**—The new station now being erected at Wolferton for the accommodation of the Prince of Wales approaches completion. The exterior of the building is constructed of Carr stone relieved with white quoins and Portland stone facings. The general waiting-room, which is 20ft. by 20ft., has an open roof. On the right of the general waiting-room is the retiring-room of the Prince of Wales, which is 19ft. by 14ft., the principal feature in the construction of which is that the plastered ceiling is being panelled with wood. The Princess's waiting-room, on the opposite side of the general waiting-room, is similar in construction and dimensions. The whole of the works are being carried out by Messrs. Bennet Bros., Downham-market, from the designs of Mr. Milne, 39, Great Marlborough-street, London.

**SOUTHPORT.**—The new Pavilion, Winter Garden, and Aquarium at Southport, just completed at a cost of £100,000, will be opened on Wednesday next. Concrete has been used with great success, more extensively, it is stated, than at any other building in the kingdom, notably for finished staircases, halls, arches, and pillars. This work has been carried out by Messrs. Smith and Fawke, of Birkdale. The whole of the timber is pitch pine, and the roofs are all open timbered, stained, and varnished; the contractors being Messrs. Haigh and Co. of Liverpool. All the works have been designed and carried out under the superintendence of Messrs. Maxwell and Tuke, of Bury, the resident clerk of works being Mr. Foster.

**WINDSOR CASTLE.**—Several portions of Windsor Castle are undergoing repairs or restoration at the hands of the Board of Works. A new oak roof is being constructed over the Dean's Cloister, which adjoins the Albert Memorial Chapel. The ancient roof has been removed, owing to its weatherworn condition, and the beams are being replaced with solid English oak grown in the district. At Henry III.'s Tower, which is situated at the east end of the houses occupied by the Military Knights of Windsor, and overlooks the moat garden of the Round Tower, a number of workmen are busily employed in repairing the exterior stonework.

#### SCHOOLS.

**NEWCASTLE-UNDER-LYME.**—The foundation-stone of a New High School was laid on Thursday week. The school stands on an elevated site of about seven acres, overlooking the town. The school building and master's house and boarding-house are all connected together, the principal school front being towards Mount Pleasant, while the boarding-house and master's house face towards the public walks and Trentham. The principal entrance to the school building is in the centre of the Mount

Pleasant front, with another entrance opposite to it from the school close. On the left of the entrance hall is an office for the school marshal and a book-store. The entrance-hall opens into a corridor 8ft. wide, the full length of the building, with the large schoolroom, 60ft. by 30ft., at the upper or east end. On the north side of the corridor are five classrooms, 25ft. by 17ft., and one lecture or large class-room, 25ft. by 26ft.; at the west end is the head master's classroom or library, 30ft. by 22ft. At the west end of the corridor a stone staircase leads to the basement, which, owing to the fall in the ground, is at this point above the ground level. Under the head master's classroom is a laboratory, which will be fitted up with the most modern appliances, and under the classrooms a chemical classroom, chemical store-room, lavatory, and an apparatus-room communicating with the lecture-room, on the same level as the principal classrooms, and between them and the master's house are an assistant master's room, boarder's dining-room, 30ft. by 17ft., and matron's sitting-room and store-rooms. The whole of the first floor above the classrooms is fitted up as one long dormitory, which is divided by wooden partitions about 8ft. high into separate cubicles, for forty boarders; these would be used as studies, and also as dormitories by the boys. Bathroom and w.c.'s are provided in connection with this dormitory. Day and night sick-rooms, bathroom, &c., for sick boys, which could be completely cut off from the rest of the boarders in case of infection, are provided; matron's bedroom, linen-closet, and box-room complete the boarder's part of the house. The kitchens and offices are in the basement, on the same level as laboratory. The head master's house contains dining, drawing, and sitting-rooms, a study on the ground floor, and eight bedrooms and two dressing-rooms, beside bath, w.c., and store-rooms on the first and second floor. The whole of the school and classrooms and dormitories will be heated by hot water, and will be thoroughly ventilated. The school close will be laid out as cricket and playgrounds. The buildings will be built of red bricks, with white stone dressings, and will be of a plain Tudor style of architecture. A tower and flèche will probably be added at some future period. The contract has not been let. The architects are Messrs. Lewis and Son, of Newcastle.

**HUDDESFIELD.**—The memorial-stone of a new Baptist Mission-room and school at Primrose-hill, Huddersfield, has just been laid. The cost will be £1,050, exclusive of land. The school will accommodate 150 children, but for the purposes of a meeting will seat 300 persons. Mr. B. Stocks is the architect.

**SKIPTON.**—The new schools in connection with the parish-church were opened on Monday last by the Bishop of Ripon. The buildings are in the Early Decorated style, and have cost about £3,000. They have accommodation for about 500 scholars. The architect is Mr. John Varley, of Skipton, and the works have been carried out by various local contractors.

**A CURIOUS TREE.**—The pottery tree of Para is one of the curiosities of Brazil. The stem does not exceed a foot in diameter, and it grows to the height of 100ft. But the peculiarity of the tree does not consist in its configuration, but in the nature of its wood and bark, which contain so much silica that they are used by potters in the production of earthenware vessels. The bark contains more silica than the wood, and in preparing the bark for the potters' use it is first burnt, and the residuum is pulverised and mixed with clay. An equal quantity of the two ingredients produces a superior ware. The fresh bark cuts like soft sandstone, and when dried it is brittle and difficult to break.

**THE BRUSSELS EXHIBITION OF FINE ARTS.**—This exhibition was formally opened on Saturday. It is confined to Belgian productions. A pulpit of carved wood made by Soyers, of Louvain, is well spoken of; there are some noticeable specimens of painting and decorations in lacquer work by Apol, of Brussels, who also exhibits a specimen in lacquer work of the panels of doors, tempore Louis XV., also panels of doors of a salon, tempore Louis XVI. Specimens of wood carvings for doors by Herman, of Brussels, are said to deserve very great credit; as also specimens of inlaid wood, by Dassin and Washer. There are also some very fantastic summer-houses, made chiefly of cane, by Van Oye Duerve, of Brussels.

#### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces. All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

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RECEIVED.—J. L.—J. H. B.—E. W. G.—B. B.—J. H. P.—C. and B.—C. B. A.—J. H. C.—H. W.—T. B.—Fugit.—T. A. R.

ROBERT CLAMP (Good tracings may be photo-lithographed. The quality of the impression will depend on the quality of the tracing. Many of the illustrations that we give from week to week are tracings from architects' drawings).—F. B. (Next week).

## Correspondence.

### VENTILATION OF HOUSE DRAINS.

(To the Editor of the BUILDING NEWS.)

SIR,—May I be permitted to make some remarks on this somewhat hackneyed topic in your valuable journal? I know it is a question you have again and again ably discussed, and until some improved system commends itself, I think it may be still profitably discussed. At this period of the year, when heavy falls of rain frequently gorge our conduits, sewer gas is more obnoxiously felt than when a more even flow through them takes place, and one occasionally finds, in passing through the streets after such rainfall, a very prolific discharge highly distasteful to the olfactory sense.

Mr. Baldwin Latham, in his able work on "Sanitary Engineering," regards rain-water pipes as totally inefficient as ventilators. But let us see the reasons he adduces in support of this opinion. First, because the house drain outlets to which they are connected are made at points sufficiently above the invert to allow just a free flow of house sewage above the ordinary sewage-level of the sewer and no more; but directly a heavy rainfall raises this level above the house-drain outlet, the latter is rendered useless as an escape, and the gas contained in the upper part of sewer forces a passage for itself, though through what passage is not told. Secondly, it is argued the rain-water pipes during time of heavy storms are doing service in discharging themselves, and therefore have no efficiency in acting in the capacity of ventilators. Now let us inquire into the soundness of these views. In the first case, the compressed gas between the storm-level of sewage and the crown of sewer, if it is of any considerable density, must escape harmlessly either through the crevices of brickwork or other openings, man-holes and the like; or it must force its way through the water seal into the nearest outlets of house drains, and thus, in the case of rain-water pipe ventilators, escapes through them. But, assuming such compressed gas cannot escape in these directions, it is evident no harm can arise. Mr. Latham does not tell us where it escapes;



and if it escapes anywhere, it must do so either through the crown or through the outlets; and therefore in either case it is harmless, provided rain-water pipes are made ventilators.

I think, then, this conclusively answers the objection that house-drain outlets are useless as ventilators. When we consider, however, the case of no ventilation to them, then the argument holds good, for the gas would find its way through the closet-traps, and the evil reaches its maximum during heavy rainfalls or gorged sewers.

Now the argument of Mr. Latham of course is to prove the value of ventilators placed at the crown of sewers. This as a supplemental means of ventilation cannot be doubted, though, as we have seen, its absence does not entail harm where the house drains are also ventilated. Having disproved, therefore, the position that house drains cannot ventilate sewers; the next question to decide is, Which is the easiest and readiest way of ventilating both? Mr. Latham's system is well known. It is the ventilation of sewers along the crown by shafts, at the summits of which trays of charcoal are introduced to deodorise and absorb the ascending gases. He further proposes the ventilation of house drains by carrying up pipes at the heads of the drains and their branches, in sufficient number to prevent the flow of water through a drain emptying traps in its rear. This last precaution is one of much importance, and is an additional reason for ventilators to drain and soil pipes. It is known as the "induced current of air," and its operation is still more observable in flushing soil pipes, or in down rushes of matter through them, which often unseat all the traps in the passage through the vacuum caused behind. Hence the utility of ventilating all soil and house drains.

While agreeing with the system advocated of ventilating both sewers and drains from houses, one fact may be noticed in the proposed plan, showing the inutility of small pipe ventilators. It may be put thus. If open manholes and shafts are proposed to ventilate the line of sewers along its route, opening from the crown, and discharging at the street level (and this is found adequate, and has been generally admitted as unobjectionable, when they are placed at intervals), why should such extra precaution be taken in carrying up pipes from traps above the heads of windows, and further using charcoal as an absorbent? If the gases find their escape through street gratings, why is it necessary to carry the pipe outlets proposed above our roofs? The latter is surely superfluous. All that is wanted is a free discharge for any gas in the drain pipes, and this can readily be effected by external outlets at every junction or trap. The use of charcoal is doubtful, and its value hardly appears to have been commensurate with the trouble and cost. Besides, a proper system of outlets is sufficient.

A LONDON ARCHITECT.

#### HASTINGS TOWN HALL.

SIR,—We beg, through the medium of your columns, to inform intending competitors for the Hastings Town Hall that we have sent an urgent request to the Mayor and Corporation of Hastings to withdraw the clause in the conditions restricting the cost to £10,000, and also to extend the time for sending in the designs to October 24; and we hope that those who, with ourselves, consider that it is impossible to meet the requirements of the Corporation for the sum named will join in our request to have the amount increased.—We are, Sir, &c.

TWO COMPETITORS.

#### FIREPROOF FLOORS, COLLCUTT'S PATENT.

SIR,—There is one general question with reference to filling-in floors with concrete that is overlooked, *i.e.*, the tendency that fir joists have to dry-rot when bedded airtight in any damp substance. A similar case was brought before me a short time since. The floor fell in, and the joists looked like so much rotten brown paper.—I am, Sir, &c., THOS. CHAS. SORBY.  
27, Brunswick-square, London, W.C.,  
September 5th, 1874.

#### WHERE THE DECALOGUE SHOULD BE WRITTEN.

SIR,—In a previous number of your paper (which I have not by me), Mr. Butterfield, I believe, said that when it was ordered that "the Creed and the Decalogue should be set up at the east end of a church, by

the east end was meant the east end of the nave;" at Wootton Wawen Church, Warwickshire, which has not been restored, they are placed on the east wall of the nave. No doubt other instances might be adduced as proof of his theory.—I am, Sir, &c., E. P.

## Intercommunication.

### QUESTIONS.

[3447].—Contracts.—In witnessing contracts is it sufficient if the architect witnesses the signature of the parties to the same, or would he be looked upon as being an interested party in case of any action at law? ONE IN DOUBT.

[3448].—Construction of Arched Principal Binder.—I have an arched principal roof to construct of 25ft. clear span. The principal rafters and collars are 10 x 6; wall posts, 6 x 6; and the curved braces, which form a complete semicircle, are 4in. thick. Would it be considered good construction to merely keep the various portions forming the curved braces together, and where they come in contact with principal rafters and collars, by iron bolts passing through braces into principal rafters and collars; joints being straight and none framed? I have an idea that if any shrinkage takes place in braces or principals, and there being no framed joints, and the bolts remaining the same length as at first, a looseness of all joints must be the result, and the braces fall down until the bolts bite, and consequently allowing the feet of principals to spread and thrust out the walls. Is it usual to make this class of principal, adopting draw boring and pinning to unite all the curved portions of braces together, and also to unite the same to the principal rafters, collars, and wall-posts? I have heard a great deal said by joiners calling themselves practical men that draw boring and pinning in the manner suggested above is thoroughly useless and ridiculous. But I have thought this apparent prejudice arose from a question of the extra labour and material it involves, which is obnoxious to them in these days of competition.—YOUNG ARCHITECT.

[3449].—Rain-water Tanks.—I should be obliged if some reader would kindly inform me what quantity of rain-water should be provided for in comparison to the area of the roofing of a mansion.—AQUA.

[3450].—Architectural.—I should be greatly obliged if you, or any of your readers, could give me answers to the following queries:—1. Is a quantity-surveyor entitled to his full charge if the works are not carried out, or if his quantities, by reason of alterations, are set aside? 2. Can an architect require that an item taken in the bills of quantities, but not mentioned in the drawing or specification, be executed as part of the contract when the bills of quantities are not recognised or referred to in the agreement; or, generally, are the items named in the bill to be considered when the quantity is not considered? If the surveyor has taken a more expensive kind of work than described in the specification, and the builder refuses to do it as taken in the quantities, and holds to the specification, can the architect have a remedy against the surveyor, or is he helpless? 3. Is it the general practice to have the priced schedule left with the architect fully moneyed out, or only the rates given? And is it usual to leave the schedule with the architect open or sealed? 4. Is it a quite legal and safe form of contract to write a letter accepting the builder's tender on behalf of the client, and in the plan and specification to put a clause, signed by the builder only, saying "This is the — referred to in my offer of date —" signed by the builder only; no witnesses? I have seen this done in good offices. 5. Suppose competition drawings are asked for a large library and small museum, and the successful competitor is employed to build the small museum only, the large library being delayed indefinitely, can he claim to be employed on the large library when it goes on, even should a new Building Committee wish for a new competition? Could he make good a claim for his competition drawings should he not be employed within reasonable time or the scheme be abandoned? Could his executors continue his claims? This is an important question, and has probably been decided by some cases. Could you refer me to any in your paper? 6. Can an architect or builder be held responsible for dry-rot appearing in a building? If an architect is held responsible for the quality of the materials and workmanship, and the construction, for what is the builder responsible? If a builder puts in bad materials, and has to take them out again, can he plead the delay thus arising for an extension of time? Some inferior material in a building has escaped the notice of the architect, and when he does observe it and order its removal the work is then very far advanced and the bad material cannot be removed without much labour and injury to other work; can the builder refuse on the ground that the architect had an opportunity of condemning the work before, and did not do so?—ARCHITECTUS.

[3451].—Windows.—What is the great principle of law which would interfere with an owner putting windows in the side of his house set back two feet from the party-wall and overlooking the garden and house of an adjoining proprietor?—IGNORAMUS.

[3452].—Boundary Walls.—As a stranger to London practice, can you tell me the custom regarding boundary walls? An adjoining owner has built a boundary-

wall entirely on his own ground. He claims some few inches more on his neighbour's side of the wall for drips. And in the case of an oak fence I am told the adjoining owner can come into my grounds and nail and fix the fence which he has put up to bound his property. I should like some one to enlighten my darkness on the whole matter.—IGNORAMUS.

[3453].—Measuring Timber.—Will some one kindly explain the exact meaning of "Queen's Calliper Measure" of timber, *e.g.*, of a piece perfectly square 12in. and 12ft. long, as compared with a round piece 12in. diameter 12ft. long, and as compared with a piece partially squared 12in. diameter 12ft. long? By what process are the length and diameter brought to show the cubic contents? Is the diameter taken as the quarter girth by Hoppus?—J. C. S.

[3454].—Stock Bricks.—Can any of your numerous correspondents give me the particulars of the stock bricks used in London; their manufacture and prices? I want to know where the best whites can be obtained.—BRICKWORK.

[3455].—Aberthaw Lime.—I want to be informed if Aberthaw lime is much used now, and what its advantages in ordinary mortar are.—BUILDER.

[3456].—Screens in Cistercian Abbey Churches.—I was much interested in your article upon "Cistercian Abbeys." Can Mr. Sharpe, or any of your archaeological readers, inform me of the position of the choir-screen, as I do not see any notice of that point? I know it is a vexed question.—ARCHAEOLOGICAL STUDENT.

[3457].—Weight of Iron.—Will any one inform me of a simple and correct method of bringing wrought iron in flanges into tons? Also to reduce cubic feet into tons?—STUDENT.

### REPLIES.

[3429].—Duties of Land Steward.—Referring to "G.'s" reply last week, stating that the land steward should be able "to draw plans and specifications for farm buildings and to estimate their cost," I should be obliged if he or any fellow-subscriber could name the best manual for both domestic (cottage) and farm details, as well as designs.—A. I. S.

[3435].—Strength of Tee Iron.—In reply to "G. P.," if of wrought iron the following formula may be used:—Let A = area of web, or part below flange in inches. D = whole depth of girder in inches; L = length of bearing in feet; and W = breaking weight in tons in centre; and C = constant = 4; then  $\frac{A \cdot D}{L} \times C = W$ .—G. H. G.

[3436].—Retaining Walls.—If the moments of the forces be taken at a point within the base at one-eighth the whole thickness at base of wall, there will be ample security, *i.e.*, the ratio of the deviation of centre of pressure from centre of wall to the thickness may be taken at three-eighths. The above is according to Rankine.—G. H.

[3436].—Retaining Walls.—Prony's formula for maximum resistance of wall is as follows:—Let R equal maximum horizontal resistance, *h* equal height of wall, *w* equal weight of bank per cubic foot, *a* equal angle of repose with vertical. When top of bank and wall are at right angles  $R = \frac{w \cdot h^2}{2} \tan^2 \frac{1}{2} \alpha$ . This agrees with Rankine. To find thickness of a retaining wall, multiply height by '344 for loose earth whose slope is 30°, and by '247 for material whose slope is 45°. I think this will meet G. P.'s query; he will find ample margin of safety. By taking the moment of the wall at twice that of the earth-prism gives a result that may be depended upon. A constant factor of safety cannot be determined, as materials vary.—G. H. G.

[3437].—Railway Curves.—When I wrote my question on this subject I had in view the case of a railway siding along which a carriage is being slowly pushed: and I shall be glad if "Engineer" will apply his formula to this case as an example. "Engineer" states that the speed should regulate the radius in all cases. Will he kindly illustrate this by an example?—G. P.

[3438].—Lattice-Girders.—"Geometrician" does not notice rolling loads, and is not sufficiently explicit. I should not think that the formula given by "Architect" would apply to every description of lattice-girder. He says that the distributed load multiplied by the span and divided by 8 times the depth will give the strains at centre of top and bottom flanges. I suppose this will apply when the load is equally distributed between the flanges by means of verticals connecting the apices, but should not think it would apply where the verticals are omitted, as the load is obviously not so equally distributed. I should be glad of examples showing the strains in each bay of a girder, with and without verticals, taking into consideration a rolling load.—G. P.

[3441].—Timber.—In reply to "G." the following is from Molesworth, and I believe, are average results:—

	Weight per cubic foot.	Crushing strength per sq. in.
Memel.....	34lb.	.. about 5,400
Red pine.....	36lb.	.. " 5,400
Spruce fir.....	32lb.	.. " 6,500

A great difference exists, depending on dryness, age of tree, &c.—ARCHITECT.



[3440.]-Specific Gravities and Strength of Stones.—In reply to "G. H.," I hereunder give the specific gravities and strength of the stones:—

	Specific gravity.	Crushing strength per sq. in.
Portland.....	2.423	4,100lb.
Bath.....	1.978	1,492lb.
Ancaster.....	2.229	2,345lb.

POROSITY IN TERMS OF BULK.

Portland absorbs	.135	of its bulk of water.
Bath (Box) "	.169	" "
Ancaster "	.166	" "

—ARCHITECT.

[3443.]-Strength of Rivets.—A safe allowance for tensile strain on rivets is 5 tons per sectional square inch, and shearing 4 tons. The best form of riveting plates depends upon circumstances; but double-riveting is more economical than single-riveting.—G. P.

[3443.]-Strength of Rivets.—In reply to "Wrought Iron," in the last issue, I beg to say the mean tensile strain of rivet iron, according to Kirkaldy, in tons per square inch, is 26.98. For riveting plate girders the rivets should be from  $\frac{3}{4}$  to 1 in. diameter, and about 3 in. apart at the top and 4 in. at the bottom, the plates being from  $\frac{1}{4}$  to  $\frac{1}{2}$  in. in thickness.—G. H.

[3443.]-Strength of Rivets.—The late Dr. Fairbairn says, in his work on "Iron Manufacture," that the punching of a plate for rivets reduces its strength in the following ratio:

Assumed strength of plate.	..	100
Strength of a double riveted joint	..	68
Strength of a single riveted joint	..	46

It is necessary to make the tensile strength of the plate between the rivet holes equal to the shearing strength of the rivets, or otherwise, in shearing stress, the weakest of the two resistances would yield, and would become the measure of strength. Some engineers recommend the diameter of the rivet should be twice the thickness of the plate, and the "pitch" (distance from centre to centre of rivet) should be twice and a half the diameter.—G. H. G.

[3444.]-Ventilation.—The cubical air space allowed in hospitals is from 800 to 1,400 cubic feet per bed. "Inquirer" is referred to the series of articles on Hospital Construction now appearing in the BUILDING NEWS. Ordinary windows allow about 8 ft. of air to pass per minute.—G.

[3445.]-Moment of Rupture.—"Student" will readily find the moment of rupture of a beam loaded at any point. If the beam is fixed at one end and loaded at the other, let A B be the beam, A being the fixed end, then the strain at any point S is proportional to its distance from the weight B, or

$$S \text{ or moment of rupture} = w \times l,$$

l being the distance of S from B or W. If the weight is distributed,

$$S = \frac{W}{2} \times l_2$$

If the beam is supported at both ends and loaded in centre

$$S = \frac{Wl}{2} \quad (l \text{ being taken from nearest pier.})$$

Now the moment of rupture is easily got at any other points by the following means. Erect a vertical in centre of span, and make it equal.

$$\frac{W \times \text{Span}}{4} \quad \text{strain there.}$$

Join its upper extremity to A and B, the points of support, then any vertical ordinate will represent the strain to the scale adopted. When the strain is equally distributed, instead of straight lines draw a parabola, and make its vertical centre ordinate =  $\frac{W L_2}{8}$  and

any other ordinate will equal strain at that point. Instead of a parabolic, a segmental curve may be employed for approximate values.—ARCHITECT.

### STATUES, MEMORIALS, &c.

PONTEFRAC.—A marble monument has just been fixed in the parish-church of St. Giles's, Pontefract, to the memory of Thomas Blanco, a native of the town, who died in July, 1873, aged 90 years. He served throughout the whole of the Peninsular campaign, and was present and assisted at the burial of Sir John Moore at Corunna. The portion of the monument bearing the inscription, which is white marble, is placed upon a large slab of black marble, and is surmounted by a cross with engraved I.H.S. in gilt letters below, and immediately above the inscription is placed the monogram of the 51st Regiment of Foot, and a crown above. The work has been executed by Messrs. E. and T. Smith, sculptors, Sheffield.

WINDSOR.—The memorial to the late Prince Consort at Windsor Castle, erected by the Royal Princes and Princesses, is now nearly completed. The memorial is formed within the walls of Cardinal Wolsey's chapel. A number of mosaic portraits of Kings and Queens and other personages connected with the history of the Castle have been placed in the panels of the false window at the west end of the chapel. The panels of the ceiling are also filled with mosaic work. The late Baron Triqueti was intrusted with the work of covering the walls beneath the windows with marble pictures of Scriptural subjects, and when these were completed the sarcophagus of the prince, surmounted by a white marble effigy of the prince, clad in Mediæval

armour, with the head reposing upon a pillow, which is supported by two angelic figures, was placed upon the polished marble floor at the east end of the chapel, the face of the effigy being towards the reredos. The latter is a conception in white marble of "The Resurrection," with gilded marble canopy, the whole being inclosed in a frame of mosaic and coloured marbles. Between the cills of the windows and the marble inlaid work of Baron Triqueti there is a series of white marble bas-reliefs, sculptured by Miss Durant. Beneath the marble seats are a series of bronze grills, consisting of monograms of "V.A." devices of the royal arms, the falcon and fetterlock, the rose and crown, daisy and crown, lions and fleur-de-lis; and a coloured marble pavement in *opus Alexandrinum* has been laid down.

### WATER SUPPLY AND SANITARY MATTERS.

CAMBRIDGE.—The Middle Level Act, which recently received the Royal assent, contains an important clause prohibiting the discharge of sewage matter into the drains under the authority of the Middle Level Commissioners.

DUBLIN.—The three engineers—Messrs. Palles, Price, and Cotton—appointed by the Corporation to investigate the various plans proposed for the purification of the river Liffey, have commenced their examination. They will receive £50 each.

DUNDEE.—A meeting of the Dundee Water Commissioners was held on Thursday week, when three offers to supply piping under the new Act, by which additional works are to be executed, were laid on the table. After consideration, the meeting accepted of the lowest offer, namely, that by Messrs. Eddington and Sons, and D. Y. Stewart and Co., Glasgow, at the sum of £28,034. 9s. 7d. This contract embraces only the laying of pipes from Dronley to Dundee.

HERTFORD.—The Phosphate Sewage Company commenced operations at Hertford last week. They have engaged Mr. Grindle, the borough surveyor, to make plans and superintend the alterations necessary for adapting the works to their process.

OXFORD.—The drainage of Oxford has at last assumed an aspect which gives an earnest of its speedy completion, the preliminary work, which was commenced last year under the superintendence of the engineer to the Local Board, Mr. W. H. White, C.E., being about to be followed by works of considerable magnitude, including the construction of a main outfall sewer of the town proper to the site of the proposed pumping station beyond Ilfey, on the Oxfordshire side, for which tenders are invited.

THE STATE OF THE RIVER LEA.—The *Herts Guardian* points out that although the Lea Conservancy Act has now been in operation about five years, and although immense sums have been spent in trying to keep the sewage of towns out of the river, the state of the stream, from Luton to Limehouse, is far worse than ever. For this the conservators are not to blame, as they have honestly tried to carry out the provisions of a most arbitrary and oppressive Act, but as to rendering the water less impure, their labours have been in vain. The water in the Upper Lea has been, during several weeks this spring, far worse than ever—polluted and poisoned by the filth from the Luton sewage works. Ware, Tottenham, and other places pour their sewage into the river, and between Tottenham and Old Ford Lock the entire river is no better than a sewer—and worse than many sewers. The people at Ware, Hertford, and other places, however, are not willing to admit that the sewage from those places does much (if any) harm by being poured into the Lea, and try to lay all the blame on Tottenham, and in support they cite a report by Dr. Tidy, wherein he states that he commenced his inspection at a spot thirty yards from the East London Water Company's premises, where the water was clear and bright. One hundred yards from the Tottenham Sewage Works it began to emit a disagreeable smell, which notably increased as he proceeded along. The odour at length became terribly offensive, and all traces of aquatic vegetation disappeared; the water was turbid, and sewage deposits could be seen all along the banks. Altogether the water betokened an enormous degree of pollution. Two alternative courses are proposed for adoption. One is to take the water for London above Hertford, and let the Lea remain for navigation and natural sewerage as hitherto. The other is to have a barrel drain to take the sewerage from Hertford to Tottenham, receiving each town's sewage by the way, with two straining-tanks in each parish, whence solids could be taken out of the one and liquid out of the other, as required, and let the rest go away. At a meeting of the Lea Conservancy Board, it has been decided to send a deputation to Mr. Slater-Booth, to urge upon him the necessity of taking some steps to prevent the pollution at present carried on of the Lea at Tottenham. It will not be surprising if the result of the interview should be for an order to be issued peremptorily stopping the liquid sewage from the Tottenham works from entering the Lea.

### LAND AND BUILDING SOCIETIES.

CHRISTCHURCH.—The eighth annual meeting of the Christchurch Building Society was held on Wednesday week. The balance-sheet showed that during the year the society received from investing and borrowing mem-

bers, £2,704. 11s. 10d.; from depositors, £2,331. 6s. 6d.; and from other sources, £41. 11s. 11d.; being a total of £5,077. 10s. 8d.; that the amount at present out on mortgage to borrowers was £3,712. 10s.; that shares had been completed, amounting, with interest and bonuses, to £188. 13s. 8d.; that shares had been withdrawn amounting, with interest, to £43. 2s. 10d.; that deposits and interest had been paid to depositors and bankers of £777. 12s. 3d.; the management expenses had amounted to £71. 2s. 5d.; and that there was a balance at bankers of £71. 3s. 3d., making a total of £5,077. 10s. 8d.

THE NEW LAW ON BUILDING SOCIETIES.—The Act passed in the late session to consolidate and amend the laws relating to building societies will come into operation on the 2nd of November next. It contains forty-four sections, and a schedule of forms to be used extending over the United Kingdom. The registrars of friendly societies are to be registrars of building societies. A terminating society means a society which by its rules is to terminate at a fixed date or when a result specified in the rules is attained; a permanent society which has not a fixed date or specified result. The Act of 6 and 7 Will. IV., cap. 32, on Benefit Building Societies is repealed, and under the present Act the societies are to continue, and every society on receiving a certificate of incorporation is to become a body corporate, and enrolments are to be sent to the registrar. Any number of persons may establish a society, either terminating or permanent, to raise money by shares for the objects mentioned, and the liability of any member of a society under this Act in respect of any share upon which no advance has been made is to be limited to the amount actually paid or in arrear on such share, and in respect of any share upon which an advance has been made to be limited to the amount payable thereon under any mortgage or other security, or under the rules of the society. Any society under the Act may receive deposits or loans from members or other persons, or from any terminating building society, to be applied for the purposes stated, and every deposit-book is to contain particulars as to the liability of the members and the provisions as to borrowing money. There are several sections as to the making, registration, and alteration of rules, and they are to be binding on all members and persons claiming an account of a member. Officers are to give security and to account and invest the surplus funds; the property of a society is to vest without a conveyance. Provision is made for payment of sums not exceeding £50 in case of intestacy. Punishment is provided for withholding books, &c., as also for obtaining money fraudulently. The statute points out the necessary proceedings for the termination or dissolution of a society. Societies may unite with others, or one society may transfer its engagements to another. Disputes may be determined by arbitration or by a court, as also by the registrar. Buildings for the object of a society may be purchased or leased, and minors may be elected members. Annual accounts are to be made, and regulations to be made with power to the Secretary of State to make orders as to fees, &c. The forms to carry out the Act are concisely worded.

### CHIPS.

Fragments of Roman funeral urns and other pottery have been discovered near Barrow Brook, one of the most romantic parts of the Sheppey cliffs. The fragments are embedded in a layer of charcoal, and were exposed by the falling-away of the cliff. Previous to the discovery there was no authentic sign of the Roman occupation of Sheppey.

Mr. Thomas Charles Sorby, architect, of London, whose design for the Holborn Valley improvements was premiated out of about 120 submitted, has prepared a new plan for relieving the vehicular traffic in the central streets of Bristol.

The foundation-stone of a new chancel, about to be added to Holy Cross Roman Catholic church, Liverpool, was laid last week. The church was built fifteen years since, from designs by Mr. E. W. Pugin.

A new parsonage is being erected at Bearley, Warwickshire. Mr. A. Sheasby, of Leamington, is the builder.

The directors of the London, Chatham, and Dover Railway are contemplating a railway to Sheerness, in the hope of opening up a new line of Continental traffic *via* Flushing. The local Board of Health will aid by the formation of an extensive marine esplanade.

The parish-church of Newton Solney, Burton-upon-trent, over four hundred years old, is now undergoing partial restoration. The work of restoring the stonework in the nave and aisle has been intrusted to Mr. H. D. Kershaw, of Burton-upon-Trent.

The workmen employed in the additions and improvements recently made to Mr. Wingfield's house, at great Barrington, from designs by Messrs. Holland and Hannen, were entertained by the owner to dinner on Saturday week.

On Wednesday week the memorial-stone of new classrooms in connection with the Wesleyan schools at Runcorn was laid. The new building will contain ten rooms besides a kitchen, &c., and the estimated cost is £1,300. The architect is Mr. C. O. Ellison, of Liverpool, and the builders are Messrs. White and Son, of Runcorn.



## Our Office Table.

**CITY PAVEMENTS.**—Cannon-street, from King William's Statue to St. Paul's, has just been paved with blocks of wood. Aldersgate-street, too, will be paved with wood in a few days; but in this street the square wooden blocks are placed upon a floor of timber, whereas in Cannon-street they are simply laid upon a macadamised bed. It remains to be seen which plan will most tend to deaden the sound of passing vehicles. Part of Fenchurch-street is being paved with the asphalt of a French company. It is understood that Fleet-street will shortly have its wooden pavement. London-bridge is to be partially closed on Monday next for repaving.

**ASPHALTE.**—In order to render asphalt less dangerous, Mr. John Lemon, of Beith, Ayrshire, in a letter to us, says: "That when the workmen are laying the asphalt, and when the material is in a soft state, by the use of a mould made of wood, I propose to form squares on the surface, and by the same method I also propose to make the squares rough, to resemble granite; for although the surface were divided into squares, the reverberations caused by traffic passing over asphalt would be almost noiseless, compared to the noise caused by granite or whinstone, so that by this simple means we would still enjoy the pleasantness of having a smooth, noiseless road."

**THE LATE MR. HENRY MOGFORD.**—Mr. Henry Mogford, whose death has been lately announced, was formerly (according to the London correspondent of a provincial paper) a picture-dealer in Craven-street, Strand, and it was in this capacity that he acquired the knowledge which enabled him to distinguish between real and sham "Old Masters." He found out, not only the tricks of the trade, but the places where the tricks were carried on, especially the "smoking process," by which new pictures were made to look as mellow as old ones. The editor of the *Art Journal*, in his account of Mr. Mogford, mentions that it was by Mr. Mogford that he (Mr. S. C. Hall) was instigated to expose the doings of these picture-forgers. They threatened him with legal proceedings, but he persevered, and described especially one manufactory of "Canalettis," not far from Richmond Bridge. The result was that the trade was ruined, and even the genuine and lawful trade was somewhat impaired, for picture buyers became shy of "Old Masters" when they learnt that they could not distinguish between the false and true.

**WATER DISTRIBUTION AND LEGISLATIVE POWER.**—In our notice of Mr. Bailey Denton's able brochure in our article on "Rainfall and Storage of Water," last week, we omitted to point out one important suggestion bearing upon the proper distribution of water to the whole country. Mr. Denton very justly observes the Government has mistaken the right course in apportioning the country into districts for sanitary purposes, "which are perfectly incompatible with a right treatment of the objects in view." The necessity of some superior presiding authority is pointed out, an authority which shall exercise jurisdiction over watershed districts, so that the relative functions of drainage, sewerage, and water-supply shall be economically adjusted. Rural and urban sanitary boards are, as we recently pointed out in these pages, anything but united: local prejudices are the moving impulses rather than effective administration. Mr. Denton observes: "Towns have been sewered without caring what becomes of the sewage"; outfalls have been neglected, and neighbouring districts have been rather discourteously shelved; and that while one community or part of a watershed has been freed of sewage or water, another has been injured by the discharge, and valleys and houses inundated. Legislature has, it is justly remarked, first encouraged us to do wrong, then pointed out the error we have committed, and finally left us without power of rectification. Reservoirs and tanks we have shown are cheaply constructed, and it has been forcibly pointed out that landowners holding life interest in village property may profitably become water contractors, constructing storage tanks upon their estates by means of borrowed money, which may be charged upon the property, and repaid by instalments; and the villages would be only too glad to pay an agreed price just sufficient to recoup the landowner upon the outlay, with a slight profit. All that is required "are legal powers to sanction a

tenant for life becoming a water contractor, and to make the recipients pay during a determined term of years." The cost of the works could be charged upon the estate which collected the water, and the "reversionary interest would be benefited by the ultimate possession of a water-property from which a considerable income would be forthcoming after the original outlay was liquidated."

**PATENT OFFICE REPORT FOR 1873.**—The report of the Commissioners of Patents for 1873 has just been published. During that year 4,294 applications for letters patent were made; 2,974 of these were passed, 2,906 specifications were filed, 1,320 of these lapsed, the applicants neglecting to proceed after the expiration of the six months' provisional protection, and 68 patents became void, the patentees having neglected to file complete specifications. During the year £11,430. 12s. 5d. was paid to the clerks and other employes engaged in the office; the total income was £144,761. 13s. 6d., and after payment of law fees, printing and stationery bills, and other current and incidental expenses, a balance remains of £95,284. 1s. 10d. The aggregate surplus income of the Patent Office from October, 1852, to the end of 1873, amounts to the sum of £1,108,204.

**COLLAPSE OF THE GREAT EXHIBITION MANIA.**—The loss of the Austrian Government in its outlays on the recent Great Exhibition at Vienna is estimated at near two millions sterling. The liberality of our own Exhibition Commissioners, who are now advertising the last few days of their show, with a reduced admission fee of 3d. each person, fails to attract more than a few hundreds daily. The American Congress sensibly refused recently to authorise the squandering of public money on the forthcoming Centennial Exhibition at Philadelphia; and we entirely agree with the American journal which records the above fact, that "this Great Exposition business is 'played out.' It has ceased to be an attraction for the masses, and is chiefly useful for the advertising purposes of enterprising dealers."

**DEATH OF SIR JOHN RENNIE.**—Sir John Rennie died on Thursday, the 3rd inst., at Bengoe, Herts. He was of Scotch extraction, and was born, in 1794, in Stamford-street, Blackfriars. He was the son of Mr. John Rennie, and was educated by his father for his own profession, and one of his first works was the execution of his father's design for the new London Bridge. He also assisted his father in building both Waterloo and Southwark Bridges. After the death of his father in 1821 he succeeded him as Engineer to the Admiralty, a post he held for ten years. Sheerness Dockyard and Plymouth Breakwater, commenced by his father, were also completed by Sir John. It was upon the completion of London Bridge, in 1831, that the honour of knighthood was conferred upon him. About that time the question of railway communication was growing into importance; the first railway had been made and was working, and Sir John, realising the value of such a mode of transport, quickly identified himself with the movement. He soon became practically connected with the construction of railways, and during the remainder of his professional career was largely identified with their progress both at home and abroad. Two other important works commenced by the elder Rennie were the drainage of the Lincolnshire coast at the Wash and the construction of the harbour at Ramsgate, both of which schemes were carried out by Sir John. The docks at Whitehaven were also made by Sir John for the Earl of Lonsdale, and various other works at home bear testimony to his genius and ability. Nor was he less successful abroad, his many important professional services there having been rewarded by several distinctions, the Knighthood of Wasa of Sweden, and that of the Tower and Sword of Portugal, among others. In 1861 he competed unsuccessfully for the erection of the new bridge across the Thames at Blackfriars. Sir John was a member of the leading institutions connected with his profession, and was also a Fellow of the Royal and other societies. He was the author of a work on Harbours; of a Monograph of Plymouth Breakwater; and of a small history of engineering, in the form of a Presidential Address to the Institution of Civil Engineers.

**KELLY'S BUILDING TRADES' DIRECTORY.**—"The Post Office Directory of the Building Trades," published by Messrs. Kelly and Co., has reached a second edition. Four years have elapsed since

the first was published, and the improvements in the present issue have resulted in the addition of more than 600 pages to the work, which is, nevertheless, published at the same price. As an evidence of the magnitude and importance of the interests dealt with in the volume, it is remarked that the last Census returns for England and Wales show that 579,326 persons were employed on houses and buildings, leaving out altogether the painters and decorators, the plumbers and glaziers, and the hundreds of other subordinate trades interested in construction and design. The importance and value of a reliable muster-roll of such an army can hardly be too highly estimated, and we think all who have found the first edition as useful as we have, will hasten to possess its successor. We should like to see Ireland included in a future issue—Scotland and Wales are already dealt with—its omission from the present edition is really the only fault we can find.

**THE CONDITION OF THE CRYSTAL PALACE.**—We have received a pamphlet written by a Mr. A. G. E. Heine, in which the present condition of the Crystal Palace is described as "deplorable." As a financial speculation, the Palace does not pay. One entire wing of the building has disappeared. The whole of the Grand Cascade of the water-works, which cost nearly £300,000, is going to ruin, the four great Sculpture courts are entirely gone, and their contents dispersed, and the works and property generally are in such a state of decay that a very large sum will have to be speedily expended upon them. A considerable number of shareholders have recently formed themselves into a "Crystal Palace Restoration Committee," and have adopted a plan originated by Mr. Francis Fuller for rescuing the property from its present condition. This plan it appears to be the purpose of the pamphlet referred to recommend. The Restoration Committee propose to form a capital to be raised in shares of 20s. each, to purchase the present outstanding debentures and preference and ordinary stock, and to apply all future earnings, not in money dividends, but to providing prizes in annual art distributions, and special privileges. 9,430 of these prizes, ranging in value from £500 to £2, are to be distributed yearly amongst the shareholders. Every share that gains a prize will be cancelled, and the number of shares being thus reduced year by year the remaining shares will naturally increase in value. What the lucky shareholders who continue in the concern are ultimately to do with their property the pamphlet does not say. We hardly envy the feelings of one of them who, having been fortunate enough to keep his share, say, through 20 annual distributions, may be congratulating himself on the, perhaps, twenty-fold enhanced value of his holding, only to be compelled to surrender it in the twenty-first distribution for a prize of the nominal value of £2. The weak part of the scheme seems to be that such a shareholder having received no benefit from his venture for twenty years may find himself no better off than another who was lucky enough to get a prize in the first distribution, while a third shareholder fortunate enough to retain his share a few years longer and to behold the abolition of the Art distributions may find his investment increased five hundred times its original value.

**EXTENSION OF THE THAMES EMBANKMENT.**—Her Majesty's Commissioners of Works and Public Buildings are about to extend the embankment wall of the Houses of Parliament 366ft. to the west of the Victoria Tower. With this extension there will then remain only one quarter of a mile river frontage from Blackfriars to Battersea-bridge unembanked. This slight break in the link is that part of the river fronting Millbank, &c., and as on the inundations in March last this district suffered considerably, representations will be made to the Metropolitan Board of Works immediately after the recess drawing their attention to the opportunity for acting in concert with the Government in carrying out a complete and connected thoroughfare along the whole side of the river.

The municipal authorities of Amsterdam are endeavouring to abolish the subterranean dwellings which attract the attention of every visitor to that city. An inspection has shown that 73 per cent. of them are not fit for habitation. Out of 3,650 which were examined, 1,000 have no windows, and the annual mortality in these dwellings is 1 in 34. It is proposed to form a society, with a capital of 1,800,000fl., for the erection of workmen's houses, which will gradually supersede the cellars, and the scheme has met with a favourable reception.



## CHIPS.

Farnborough Church, Warwickshire, is about to be restored by Sir Gilbert Scott, at a cost of £4,000.

The London and North-Western Railway Company are about to make improvements at their station at Lancaster which will cost £20,000.

A new park is to be provided at Grimsby.

The foundation-stone of a new Convalescent and Seaside Home for Orphans was laid on Saturday week at Margate. Messrs. Drewe and Bower are the architects.

It is said that the Duke of Northumberland intends devoting part of the purchase-money of Northumberland House to the improvement of Trafalgar-square. The Landseer lions are to be surrounded by a bed of dwarf evergreens, and gravel walks and flower beds are to take the place of the asphalt pavement.

New Church schools were opened at Skipton on Monday. The building, which is in the Early Decorated style, has cost £2,900, and accommodates 600 children. Mr. Varley, of Skipton, is the architect.

The members of the Architectural and Archaeological Society of Durham and Northumberland visited Thirsk on Friday, and inspected the Church. Mr. W. H. D. Longstaffe, of Gateshead, explained to the members the architecture of the building.

The first schools erected by the Gateshead School Board were opened on Monday. Accommodation is provided for upwards of 1,800 children in four schoolrooms and eleven classrooms, at about £7 per head, exclusive of the cost of site. Mr. Thomas Oliver, of Newcastle, was the architect.

Mr. Lloyd Hoppin, of Philadelphia, whose model of Windsor Castle is exhibited in the South Kensington Museum, has lately finished copies in cork of the architectural features of Holyrood Palace, Fountains and Tintern Abbeys, and the Church of Stratford-on-Avon.

A new public hall, from designs by Mr. F. Barnes, has just been opened at Dovercourt. Messrs. Gibbons, of Ipswich, were the builders. The cost was £2,500.

Mr. Cheeswright, C.E., who has just successfully completed the erection of a screw-pile lighthouse in the Straits of Malacca, has lately arrived at Coconada for the purpose of commencing operations for the erection of a screw-pile lighthouse at that port.

On Wednesday, the foundation-stone of the new Gamble Institute at Gourrock, N.B., was laid. The building, which will contain two public halls and a public library, will cost £7,000.

St. George's Church, Paisley, was reopened on Sunday, after the addition of a new organ-chamber, from the designs by Mr. J. A. Rennison, architect.

Mr. Lowman Taylor has given notice of his intention to move, at the next meeting of the Court of Common Council, to consider the present state of Temple Bar and its approaches.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHELVEING, AND OTHER FITTINGS  
Of the best Manufacture.

CHUBB'S PATENT LOCKS,

CHUBB AND SON,

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57, S. Paul's Church-yard, E.C.

And 68, S. James' street, S.W.—[ADVT.] } London.

## Trade News.

## WAGES MOVEMENT.

DROGHEDA:—The operative house-painters are on strike, owing to their employers using the services of a number of boys, and excluding men. The trade society proposed that each employer should have two apprentices.

KIRKCALDY:—The operative masons of Kirkcaldy, Linktown, Pathhead, and Dysart struck work on Saturday, owing to their employers refusing to pay weekly instead of fortnightly wages, and also to bind their apprentices.

LONDON:—A large portion of the operative coach-painters will probably soon be out on strike. Last year, after a contest of several weeks, the men obtained an advance of 25 per cent. in wages, from 26s. to 28s. per week from the majority of their employers. Some of the masters have since returned to the old rate of wages, and it has been resolved that the men in those shops be withdrawn.

WISBECH:—The bricklayers of Wisbech a few days ago gave notice to their employers, by circular, that unless they are paid at the rate of 5½d. per hour, instead of 5d., as heretofore, they will cease work.

## The Timber Trade.

The wholesale current prices for timber, deals, &c., are as follows. The market is still in a languid state, and much difference of opinion exists as to how prices will rule during the winter.

Per 120 12ft. 3 by 9.

		£	s.	d.
Sh d lac spruce	3in.	16	10	17 0
" "	2½in.	15	5	15 10
Quebec, 1st spruce	9in. to 11in.	20	0	21 0
" "	7in. to 11in.	18	0	
Per 120 12ft. 2½ by 6½.				
Dram, 2nd yellow	2½ by 5½	10	10	
" 3rd "	2½ by 6½	10	5	10 15
" 4th "	2½ by 6½	10	0	
" 3rd white	2½ by 6½	10	0	
" "	3in.	9	5	
Wayas, 1 & 2 yellow	3 by 9	15	10	
" 3rd "	2½ by 7	14	10	
" "	3 by 9	14	5	14 10
" "	2½ by 7	13	10	
Archangel, 1st yellow	3 by 9	15	15	
" 2nd "	3 by 7	12	10	
Swartwick, 3rd "	4 by 9	15	0	
" "	3 by 11	15	0	
" "	2 by 9	14	15	15 0
Nedre Calix.	3 by 9	15	0	
Sandarne, 3rd "	4 by 9	15	0	
" 4th "	3 by 11	14	0	
Petersburg, 1st "	3 by 9	16	10	
" 1st white		12	15	
Kotka, 1 & 2 yellow	3 by 10	12	10	
" "	3 by 7	12	0	
Gefle, "	4 by 9	15	15	16 0
" "	2½ by 7	14	10	
Soderham 1 & 2 white	3 by 7	10	10	
" "	boards	9	5	9 10
" 3rd "	3 by 7	10	0	
" "	boards	8	15	
" 1 & 2 yellow	3 by 9	16	10	
" 3rd "	3 by 9	14	0	
Soroka, 1st "	3 by 11	15	15	
Sandvik, 1 & 2 "	3 by 9	15	10	
" 3rd "	3 by 9	14	10	
" 4th "	3 by 9	13	10	
Alfredsham 1 & 2 "	3 by 9	14	0	
Ljusne, 4th white	3 by 9	9	10	
" 3rd yellow	3 by 9	13	10	
Summas, 3rd "	3 by 9	15	10	
" "	4 by 9	14	10	
" "	2½ by 7	13	10	14 0
Hudikswall, 4th white	2 by 7	9	10	
" "	2½ by 7	10	0	11 0
" "	2½ by 9	10	5	
Nyham, 3rd yellow	2in.	15	0	
Gothenburg, 3rd "	3 by 9	13	5	13 10
" 4th "	3 by 9	12	5	
Memel 2nd "		13	0	
" 3rd "		11	15	12 0
Gothenburg, 3rd "	3 by 8	13	10	
" "	3 by 11	14	10	
" "	3 by 7	13	10	13 15
Pitch pine		13	0	
Quebec, 1st bright pine	wide	22	15	23 0
" 2nd "	11in.	22	0	
" 3rd "	wide	15	10	
" 1st floated pine	11in.	13	0	
" 2nd dry "	wide	12	10	
Bjorneborg, 1 & 2 yellow	8 to 10	19	15	20 10
" 2nd dry "	11in.	15	10	
Bjorneborg, 1 & 2 yellow	3 by 9	14	10	
" 3rd "	3 by 7	13	0	
Stockaviken, 1 & 2 "	3 by 9	15	10	15 15
" 3rd "	2½ by 9	14	10	
" "	3 by 8	14	0	
Hernefors, 1 & 2 "	3 by 9	15	10	
" "	3 by 8	14	10	
" 3rd "	3 by 9	14	10	
Gefle, 4th "	3 by 9	14	5	
" "	3 by 11	13	10	
" "	2½ by 7	13	10	
" 3rd "	3 by 9	15	10	
" "	4 by 9	15	0	
" "	4 by 12	15	0	

Per cubic fathom.

Petersburg lathwood	10	10
Riga, &c., "	8	10
Dantzic "	8	5

Flooring boards per square.

		s.	d.
Best yellow	1½ by 7	21	0
" "	1 by 7	15	6
" "	1 by 6	15	0
" "	1 by 5	14	0
Second yellow	1½ by 7	18	3

Per 40ft. 3in.

Dantzic cro. deck	5in.	26	0	26 6
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The price of hewn timber remains the same as quoted last week, but there is a downward tendency in prices, which appears likely to continue. Swedish, from its cheapness, is most in request, and the stocks on hand are of very good quality.

## WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed on a day's delay. For samples and further particulars, apply to the MANAGER, at the Quarries, Narberth-road, R.S.O.—[ADVT.]

## TENDERS.

BRIGHTON.—At the last meeting of the Brighton Town Council, the Works Committee reported the receipt of several tenders for the supply of paving materials, and resolved upon accepting the following: Mr. John Hamley, to supply 500 tons of Guernsey granite at 12s. 6d. per ton; Messrs. J. E. and B. White, Ringmer, 60,000 bricks at £3. 7s. 6d. per thousand; Messrs. J. and R. Norman, Chislehurst, 50,000 at £3. 8s. 6d. per thousand; Mr. John Gravett, St. John's Common, 50,000 at £3. 8s. 6d. per thousand; Mr. Joseph Briston, Hove, 30,000 at £3. 8s. 6d. per thousand; and Messrs. A. and N. Norman, St. John's Common, 55,000 at £3. 8s. 6d. per thousand.

CAMBERWELL.—For new workshops, Camberwell House, for Messrs. Paul and Richards. Mr. W. Adams Murphy, architect. Quantities supplied.

Shapley	£1,080	0	0
Waldram and Co.	1,619	0	0
Newman and Mann	1,016	0	0
Cooke and Green	1,002	0	0
Sharlington and Cole	999	0	0
Canning and Mullins	998	0	0
Tompkins	984	0	0
Sewell and Son	973	0	0

For the restoration and rebuilding of St. Nicholas Church, Sir G. G. Scott, R.A., architect. Quantities supplied by Mr. J. S. Lee, Craven-street, Strand.

	Church.	Tower.	South Chancel.	Nave.	Fittings.	Total.
Thompson	£2,442	£3,601	£273	£1,139	£14,996	£20,451
Brown	2,600	3,100	273	1,080	14,996	20,059
Bel	2,580	2,713	273	1,080	14,996	19,542
Booth	2,580	2,713	273	1,080	14,996	19,542
Johnson & Shaw	2,580	2,713	273	1,080	14,996	19,542
Dove Bros.	2,580	2,713	273	1,080	14,996	19,542
Grinwood and	2,580	2,713	273	1,080	14,996	19,542
Sons	2,580	2,713	273	1,080	14,996	19,542
Everett & Son	2,580	2,713	273	1,080	14,996	19,542
Collins & Cull	2,580	2,713	273	1,080	14,996	19,542
Lee	2,580	2,713	273	1,080	14,996	19,542
Saunders	2,580	2,713	273	1,080	14,996	19,542
Grimes	2,580	2,713	273	1,080	14,996	19,542
Dobson	2,580	2,713	273	1,080	14,996	19,542

The lowest tender, that of Mr. George Dobson for £10,873, was accepted, but only a portion of the work has been actually contracted for, as the funds subscribed will not admit of more. This portion consists of the shell, i.e., the walls, roof, &c., which will cost £4,944. The tower is not included in the works contracted for, as Mr. Kerrington has undertaken to contribute that portion of the building.

FLEET-STREET.—For alterations to the front of No. 109, Fleet-street, for Messrs. Collinson and Lock.

Bricklayers' and Plasterers' Work.

Wyatt (accepted)..... £196 0 0

GRUNDISBURGH-CUM-BURNH.—For the erection of new Board Schools. Mr. Ridley King, architect.

Cannold..... £1,581 0 0

Bennett..... 1,450 0 0

Luff (accepted)..... 1,361 0 0

HAMPSTEAD.—For the erection of a villa for Mr. C. Wills. Mr. Theodore K. Green, architect.

Perry Bros..... £2,145 0 0

Adamson..... 2,130 0 0

Shepherd..... 2,125 0 0

Newman and Mann..... 1,975 0 0

Scrivenor and White..... 1,950 0 0

Sharlington and Cole..... 1,927 0 0

Lawrence..... 1,903 0 0

Brown and Robinson..... 1,905 0 0

Simpson and Baker (accepted)..... 1,899 0 0

KENILWORTH.—For residence on the Abbey Hill, for Mr. A. Morris. Mr. E. H. Lingen Barker, architect.

Simmonds..... £1,521 0 0

Clark..... 1,095 0 0

Parker..... 1,090 0 0

Smith..... 1,074 16 10

Ball and Clark..... 1,067 1 9

Foster..... 1,031 10 0

Swain..... 1,026 12 8

Sheasby..... 1,005 16 2

Davis..... 994 14 5

Mills (accepted)..... 977 2 10

Architect's estimate £1,020

LIVERPOOL.—For the erection of the Walker Art Gallery. Correction.—In our list last week, the tender of C. W. Mullin was erroneously stated as £19,000. It should have been £18,619. It was purely a printer's error.

WOODFORD.—For the erection of two houses in Saute-lane, Woodford. Messrs. Hooper and Lewis, architects.

Quantities not supplied.

Judd and Hawkins..... £2,530 0 0

Stains and Son..... 2,848 0 0

Linn..... 2,670 0 0

Wells..... 2,308 0 0

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## THE BUILDING NEWS.

LONDON, FRIDAY, SEPTEMBER 18, 1874.

## MASS AND DETAIL.

IF the characteristics of our architecture were to be summed up in two words, no two would more adequately express them than those at the heading of this article. They may be further paraphrased under the synonyms "Lumpiness" and "Wiriness"; and lest any of our readers may doubt the precise shade of meaning intended to be conveyed by these words, we may refer to the etymology of them as giving with more accuracy the ideas we wish to convey. The Latin *massa*, a body, a collection, a whole; and the French *détailler*, to cut up in pieces, adequately designate the two ideas or conceptions of design. By the first we would intend the assemblage and combining principle; by the latter, the cutting-up and piecemeal process; and if we take as examples the greatest epochs of art, acknowledged as such by all—the Greek of Pericles, Ictinus, and Phidias, the Roman-sque of Augustus, and, passing over the Roman styles, the Mediæval of the thirteenth century exemplified by the great works of Westminster, Salisbury, and Lincoln, of our Edwards, and the great French exemplars of Amiens, Rheims, and Chartres—we shall be convinced of one ruling principle, and the remarkable absence of another which has been the peculiar sign and precursor of decadence in architecture, as in all subordinate arts of their periods. The inference may be immediately seized—indeed, he would be a blind critic who did not at once perceive the great and unmistakable difference in the maturity and perfectness of art and its decline. Without wishing to be prophetic in art, or to whisper forebodings of its prestige and future, let us simply point out certain coincidences, and suggest an antidote.

Pervading all the compositions of the greatest art-epochs, we are bound to acknowledge the dominance of Unity. All writers on design agree in making this attribute an element, if not the presiding one. It is a most remarkable evidence of design both in nature and in art. Paley rests his "evidences" on a central fact, a pervading purpose; philosophers from Plato to Bacon have maintained a like dependence of all thought and matter, although reasoning from different hypotheses; and Art, in her greatest productions, has, so to speak, centralised the conception by enthroning it as one of her greatest virtues. Unity, then, as distinguished from separation or disjointedness, becomes an important sign of correct art; and if we inquire what specially marked this character, we shall find that, in architecture at least, it was (1) *connection* of parts and (2) *outline*. In one word, it was *mass*—a regard for the outline and form, in opposition to the filling-up or detail. We have, then, this essential distinction, that "mass" deals with *outline* and *connection*, while "detail" deals with *division*. But there is something more than this: there is another and more important distinction, which is very significant of the best periods of art, as distinguished from the declining periods. It is this: in the former, attention was mainly bestowed upon the *surfaces*, the forms in the mass; but during the latter this was completely neglected for the *lines* and subdivisions. It is important to bear this distinction in mind, as it will account for that transference of the attention, which Ruskin notices, from the wall surfaces to the window tracery, which we shall presently allude to.

Let us first remark the broader influence of mass and detail. One thing will strike us in viewing the Early Pointed style of the thirteenth century, viz., the extreme attenua-

tion and wiriness of many examples, which often detracts from the outline and mass of the design. Take the interior of Salisbury Cathedral or Westminster Abbey. There is a reedy look about its clustered shaftlets, piers, and arch-moulds which one would gladly exchange for the massive rectangular piers and engaged shafts of Durham, or those in the transepts of Winchester. The detached shafts surrounding the circular pillars seen at Salisbury, Chichester, and Westminster, present an insecure and weak appearance, especially when we here and there discern a crippled shaft which has started at its joints, and which is held in its place by a band of iron. Again, who, after viewing the beautiful outline of Salisbury, does not regret the miserable taste which frittered away its western façade in the manner it is; indeed, we could have almost wished that Sir Gilbert Scott's labour had been spared in restoring such a weak design. Its arcaded masses and surfaces completely mar the otherwise perfect exterior of this cathedral. The west front of Wells, or the triple portal of Peterborough, are far better in design, though in the former of these the fault is noticed of breaking the angles of the buttresses at the corners by allowing the arcading to be cut at the angle; that is, the arches are joined at their apices at the corners instead of being finished by a corner shaft and allowing the mass to be clearly defined. These instances will be found rather exceptional; but in examining this tendency of the Early English architects to cover their plain surfaces with arcades and shafts, one thing will be observed which places this kind of detail or division of parts in a different category to a later style. The architect or mason who thus arcaded his fronts, did so in a decorative way purely; he never thought of making his detail determine the outline or mass; it was always subordinate to the masses, which appear to have been designed first, and then divided in the manner seen; and thus we see he was so far regardless of the structural meaning of his detail, that he allowed it to be cut in two by the bounding angles of the building. On the contrary, it will be found that in the decline of a style, the detail took a very much more prominent place—it, in fact, *regulated* the masses and forms. While in one case the detail was made for the mass, leaving it the prominent place, in the other case the mass was made for the detail, which completely usurped all the interest in the design. In all the more perfect examples we shall find a strict subordination observed, the mass and detail being equally well cared for; but the latter always determined and regulated by the larger masses and forms. To illustrate these principles, we will take the buttress and pillar as exemplifying in their development these changes. What do we find characteristic of the early buttress? In the Norman form we find it a flat pier hardly yet emerged from its prototype, the classic pilaster. In the next period, the Early English, it received its proper function as a buttress, and *depth* instead of breadth was given to it. In the best examples we find it rectangular, carried up the same size, though often stepped back, or reduced in bulk by stages, as we find is the case in the beautiful aisle buttresses of Salisbury, which are capped above the parapets with gabled faces. The prevailing character given to the purest type of buttress is one of support—its mass and outline are everything. In the subsequent styles we see a gradual transformation going on. The purpose of a buttress is gradually lost sight of; a succession of features is introduced, as moulded, gabled, and crocketed stages, panelled and niched faces, till we ultimately find the buttress dwindled down to a slightly carved projection profusely enriched with crocketed heads and panels or niches. Indeed, it has become a merely appended ornament, and is used not as a buttress but as an ornament. In this transformation we shall discover a

change in the process of design. Not satisfied with simple mass and outline, attention was turned to the face, and by a series of reductions and sinkings, the outline became to be regarded as subservient to the lines and mouldings thus produced, till at last a buttress was looked upon as a pedestal for canopied niches, and was designed in reference to a niche, or a something to display the intricacy of mouldings, interpenetrating lines, and other devices of the stonemason's and carver's art.

The process of decline in Art is discernible also in the growth of the moulding and shaft, and is well described by Ruskin. In the earlier instances we see plain cylindrical shafts and beads alternating with squares, as in the Early Norman. These concavities were associated with the rounds, the eye still dwelling on broad surfaces; till in course of time the "ridgy process" of fillets and concavities is carried to such an extent that the roll is lost and the eye rests only on lines of light instead of broad faces, and all gradation is lost. We may note, for instance, the simple square pier, with four round shafts placed in the centres of the faces. Later on, the shafts became to be multiplied, but still they were placed as subordinate pillars against a central mass or column, which was at first cylindrical and afterwards of quatrefoil section, or otherwise scoloped out to receive its attendant shafts. (It may be observed that the Northern Gothic architects used the round pillar in preference to the rectangle as the nucleus, while the architects of the South retained the classical form of the latter.) Now so long as a central mass or form remained apparent the pillar was a beautiful object, but before long the central idea was lost; multiplicity of shafts, channellings, and fillets became the principal idea of the designer, mass became sacrificed to detail, till confusion and intricacy of lines distracted the eye and disgusted the mind, till people yearned for simplicity, and once more "breathed again" at the simple forms of Classic art.

We might give other examples, but we will simply conclude the present remarks by observing, with Ruskin, that the decline of every style may be traced to the transference of attention from *masses* and *forms*—or light and shade—to the *lines*. This is observed in window tracery as much as in the two other examples instanced; where first the aperture or form of piercing was regarded, and subsequently only the mullions and bars. When both were attended to there was perfection.

## WHITE BRICKS.—II.

## PUGGING.

ORDINARY pug-mills consist of a centre spindle, carrying a number of radiating inclined knives, turning in a cast-iron or wooden case, open at the top, and with a mouthpiece on one side for the delivery of the clay. These pug mills are usually turned by one horse, and filled by one man. The upright shafts are generally made square. The knives are sometimes bolted through the shaft, but it is better to form them with square sockets, and key them on to the shaft. If the pug-mill is worked by steam, and a quick delivery is required, the lower knives may be removed, and an archimedian screw substituted for them. The usual plan of mixing the ashes with the clay is to form a bay in one side of the pug-mill, and wet up the clay in a soak-pit for some hours previous to the grinding, spreading the ashes over it, and wheeling it to the pug-mill as it is required. All these observations as to mixing, and grinding, and subsequent pugging, are intended to apply more especially to the manufacture of bricks of a superior class. For common bricks, the mixing by such a machine as that described, and subsequent wetting-up by hand, would be all that could be afforded. It may, however, be taken as a rule that the more



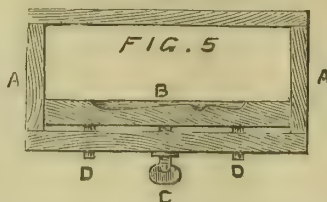
thoroughly the materials of a brick are mixed together, the better the brick will be. The proportions of clay and sand, where these only are used, are from six parts of clay to two parts of sand, to six parts of clay and four parts of sand.

#### HAND MOULDING.

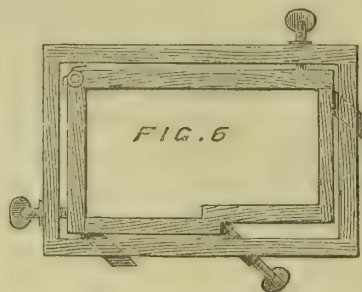
*Sand Stock Moulding.*—This is the common practice in the west of England, and it is certain that the bricks so moulded by a good brickmaker are much cleaner and sharper than those moulded slop fashion. Care is required to keep the table clean, and well sanded with dry moulding sand. If the clay requires pugging, it is generally delivered in barrow-loads to the moulding tables without charge to the moulder. The cost of digging clay, including rubbling, is 1s. 6d. to 1s. 8d. per ton; digging sand, 6s. to 8s. per ton; drawing clay and sand to clay-mill, 6d. to 8d. per ton; dry grinding, mixing, wetting up and pugging, and wheeling to tables, varies from 4s. to 5s. per 1,000, according to circumstances. If the brickmakers temper their own clay, instead of the last four items, they are paid 3s. per 1,000 extra—about the same cost, but the work is not so well done, and ought

cut it off, and strike it. Large numbers of bricks are made by these gangs, frequently from 30,000 to 35,000 per week. In Staffordshire, the work is carried out generally by a

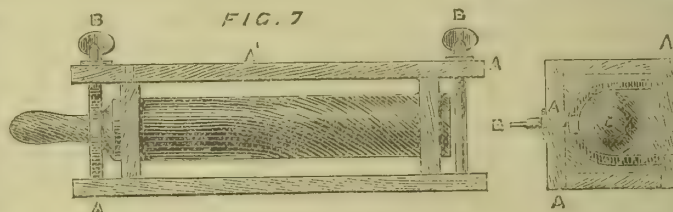
SCALE 1½ INCH = 1 FOOT



man and two women or boys, and the bricks are carried away, sometimes singly, sometimes two together (generally borne upon the head), to be deposited upon the floor in the drying



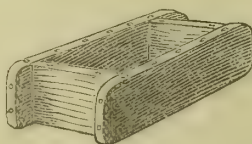
shed. The process of lumping is sometimes carried out in connection with slop moulding. It requires a table of solid brickwork, with a plaster slab on the top of it, in a wooden frame. The moulds have to be made exceedingly strong, and it is better to tie them together with wrought-iron bolts. The mould is filled in the usual way, leaving the clay projecting above it; it is then turned over, and the moulder, raising the mould with the



clay in it with both hands, dashes it down upon the table, and the lump of clay is squeezed into the mould; the mould is again turned over, and the same process is then repeated; the superfluous clay is then cut off, and the brick struck in the usual manner. The lumping process is sometimes only carried out on one side.

*Moulded Bricks and Fancy Goods.*—Much more care is required in the manufacture of these bricks than for ordinary bricks, as, unless great care is used in filling the moulds and pressing the clay into the angles, and also in getting the bricks out of the mould the result is likely to be very imperfect; the bricks are apt to get a slight twist which subsequently dressing will only partially remedy. The line of the moulding is broken and the

FIG. 8



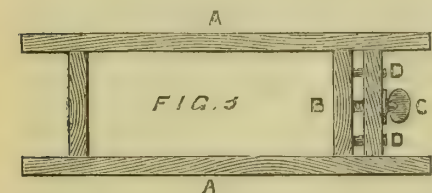
effect of the cornice or reveal entirely spoilt. It is better to form the moulding out of a brick the size of an ordinary brick, and build up a cornice in 3in. or 4½in. courses. Larger bricks are more expensive, and difficult to make, and the waste in burning is very uncertain. The

mouldings should be as large as possible. Moulded bricks may be divided into three classes: No. 1, those moulded at the end; No. 2, those moulded at the sides; No. 3, those moulded on the face. No. 1 are those most commonly made. The usual plan is to fix a block, with a reverse of the moulding on it, in the angle of the mould, well screwed to the side and end. This plan answers very well with a good moulder with simple mouldings; but if the moulding is a compound one, and the fillets are small, it is very difficult to get them out clean and sharp in such cases; the following modification of the usual plan may be tried with advantage:—The block is not screwed to the mould, but is formed with two tenons which are made to fit loosely into mortices in the mould. The loose block is also housed into the mould about ¼in. at the side, ½in. at the end, the lower block and the housing being slightly bevelled in order to keep firm when it is screwed up into its place. The block at the end of the mould should be fitted with tenons into the end of the block at the side. A thumb-screw is fixed into the block working in a nut in the end of the mould. The block should be drawn half back when the mould is ready for use; when the mould is filled the block should be passed forward and the superfluous clay squeezed out removed by the strike. If the block is then drawn back again before the brick is freed from the mould, the moulding will come out perfectly sharp and clean. This form of mould is shown in Fig. 4.

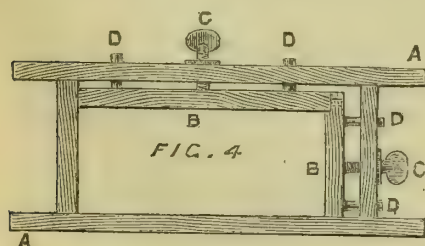
Bricks moulded at the side are frequently made by screwing a reverse moulded strip on the stock; or, better still, by fitting a bottom to the mould, and screwing the moulded strip to the bottom, the mould with the brick in it requiring to be turned over, before it can be freed from the brick. The same plan mentioned above can be used with advantage for moulding these bricks; in such a case it is better to use two round iron dowel pieces, screwed into the block, instead of wood tenons. The same plan may also be used with advantage for forming foliage on the sides or ends of bricks, provided the foliage is not raised or sunk too much. (See Fig. 5.)

External and internal angles are required for both these descriptions of bricks. The first description are simple, and easy to make, and can be made in ordinary brick moulds. The internal angles are more difficult to make, as they have to be of an L shape. They are generally made by cutting two of the moulded bricks, when half dry, to the proper angle to enable them to mitre correctly, sticking them together with slip and properly dressing them. The number required is so few that it is scarcely worth while to make a mould for them. A moulding may be made on the second principle as Nos. 4 and 4A, which is both a double parting mould and a folding mould: It is illustrated and described as No. 6, under the head of Forms of Moulds. Bricks moulded in the face (No. 3) comprise those which have either rebates, grooves, or ornaments on the face. These have already been particularly alluded to above. Rebated bricks are made by fixing a strip upon the stock, and if double rebated by using a loose strip also on the top of the mould. Grooved bricks, which are used for flues in drying sheds, and in pairs for air bricks in walls, are made by using a stock with beads or other projections worked upon it. Bricks with ornaments upon the face or bed are best made, if the ornaments are upon the face, by using a parting mould such as that above described; if on the bed or flat of the brick, by screwing the pattern, which may be cast in soft metal from a plaster mould, upon the face of the stock.

*Wall Facings.*—These are generally made



never to be resorted to for strong clay, if it is desired to turn out first-class bricks, as lumps remain in the clay which will not take the water, and appear like stone in the brick after it is burnt. The usual process of sand stock moulding is as follows: The sand-box and the water-trough are placed on the right-hand side of the moulding table, the wood strike being kept in the water-trough; the mould is first thoroughly wetted in the water-trough (a careful moulder will generally keep a small brush in the water-trough to assist in wetting and cleaning the mould), it is then sanded with a handful of sand, skilfully thrown over it, and placed upon the stock in the middle of the table. The moulder also wets and sands his hands, he then with a wire cuts a lump from the heap of clay, and rolls it rapidly on the table to the rough shape of a brick; taking this lump in both hands, he dashes it into the mould, cuts off the superfluous clay with his wire, runs the wet strike



over the surface backwards and forwards, transfers the mould to a brick board on the stack barrow, and after a slight shake withdraws the mould from the formed brick, leaving it upon the barrow. This process occupies less than a minute. A good moulder working by himself, if his hacks are not too long, will mould, wheel away, and set in hack, 600 bricks in a long day of twelve hours. With a boy to mould the lumps, and another to wheel out and set in hack, he will make from 800 to 900 in the same time.

*Slop Moulding.*—This differs from the last process in that the moulds are made very wet with water, instead of using water and sand. The slop moulding is performed by a gang in the London brickfields, when the moulder does nothing else but put the clay into the mould,



by machinery similar to that used for making perforated bricks, but they may also be moulded by hand. The Broomhall Co.'s Patent bricks were made at Beacon Hill in hand moulds. These moulds were so made that both the sides fitted loosely upon tenons formed on the ends, and were held together by thumb-screws working in the ears of the mould. A roller with a handle at one end (Fig. 7) was passed through both ends of the mould. The mould was open on both sides, the clay was squeezed into the mould from both sides, the superfluous clay removed and both faces struck, the roller was then withdrawn, the mould opened by means of the thumb-screw, and the hollow double facing released. The grooves were cut in the dressing by a revolving star-shaped knife. Follett's patent wall facings were made in a similar manner, with the addition of a loose slip to form the rebate.

**Forms of Moulds.**—They are generally made of beech, but hornbeam is a better, though at the same time a more expensive, material. The mould should be bound with iron all round the edges of the sides and ends, and securely nailed (Fig. 8); as, otherwise, the wood is apt to splinter and damage the bricks. Arch bricks are made by bevelling the top of the mould, and forming the stock also on a bevel. Splays, or Bull-noses, are formed by fixing blocks in the angles of the moulds; moulds are also formed in the manner above described under the head of Moulded Bricks. Folding moulds are sometimes made in the form of a box, to open with a hinge; but this is a bad arrangement, as every mould ought to be lifted perpendicularly off a brick, unless it is from a perfectly flat face. Parting moulds are especially referred to in the moulds mentioned under the head of Moulded Bricks. They are sometimes made without parting screws, and merely connected together with iron dowels. Such moulds made to part in the centre, when from the form of the moulding the mould is required to be in two parts, are very much better made with parting screws, as the jerk required to separate the mould from the brick is very apt to twist it out of shape. Moulds in two or more pieces have been already referred to above. Every mould is, in fact, in two pieces, as the stock forms a very important part of the mould. The moulds for making rebated bricks are of this class, also the compound moulds for making wall facings. Plaster moulds, for more elaborate work, are made in several pieces, but these are not so much required for bricks as for terra-cotta blocks of larger size.

**Dressing with Beaters.**—This process is required for all face bricks, unless pressed in a machine, which are required to preserve a true and uniform surface. The beaters are generally flat, with a round handle to them, something like a broad trap-ball bat. For moulded bricks an additional beater is sometimes provided, with a moulding upon it having the same profile as that proper to the moulded brick.

**Hand Pressing.**—The bricks when rather more than half-dry are inserted in a box in which a piston works forced upwards from the underside by an eccentric cam motion against the cover of the press. The lever being moved still farther forward, the fastening of the cover is disengaged the cover raised, and the brick so far lifted that it can be removed. Such presses can be arranged to press moulded bricks of any form.

**Rubbing Bricks.**—These bricks require great care in their manufacture, as the clay must not be only dry-ground and pugged, but also slipped and carefully run through a fine sieve. It then requires to be dried, carefully mixed with the proper proportion of sand, then to be wetted up, and pugged again. The proportions of sand and clay vary according to their quality, but may be taken generally to be about 5 of sand to 4 of clay. The moulds are not required to be quite so large as those for ordinary bricks, as, owing to the large proportions of sand they do not shrink so much. These

bricks should be carefully protected during drying, and if possible be dried under a shed by artificial heat. The cost of their manufacture is from 30s. to 40s. per 1,000; but they may always be sold at a very considerable profit. In setting and burning, care should be taken to place them a little above the middle of the kiln; so that they may not be flared, and as little weight should be placed upon them as possible, as, owing to their composition, they are very easily put out of shape.

A machine for cutting and rubbing bricks to any required angle was designed by the author for the Beacon Hill Co. A quick reciprocating motion was given to a sliding frame carrying a suitable chisel, by means of a fly-wheel and crank, the brick being clamped between jaws on a moveable table having a universal motion, so that the brick could be constantly forced up against the chisel. For rubbing bricks a piece of York stone paving was substituted for the chisel. This machine was found to work well; but it was very little used, owing to the failure of the Company.

## COLOUR.—VI.

### GRADATION OF COLOUR IN ARCHITECTURE.

WE here come to speak of the proper employment of colour in the interiors of buildings; and it at once occurs that, as every apartment has its special purpose, it would be manifestly wrong to lay down a scale of colour for all alike. Taking domestic apartments first, we have various conditions to consult, which we may generally enumerate under the following heads:—1. Size of room; 2. Character of ditto; 3. Amount of light. It may be generally observed that the smaller the apartment, the less vivid or strong should be the contrast; and, therefore, in such rooms the assortment of colours should be one of unison or "harmony of analogy," i.e., colours of approximating scales, or tones of the same colour. Again, the less the quantity of light in a room, the lighter should be the tones of colour used. It would be ridiculously destructive both of size and light to have a small room covered with dark or strongly-coloured hangings, as we occasionally see. For rooms badly or insufficiently lighted, the walls should be devoid of any positive colour which would absorb the light. A normal gray or broken white is best for the larger surfaces; the lesser lines and mouldings may be of a darker grey, or of a colour tinted with the complementary of the wall colour, or grey. If more contrast be desired, we can use the warmer tones of this complementary colour. The same gradation of scale should be observed in respect to furniture: the larger the surfaces exposed, the lighter or more retiring should be the colour.

M. Chevreul makes some *à propos* observations on the interior decorations of houses. Speaking of hangings, he observes that as an apartment is never too light—as we can always diminish superfluous light—the hangings should be of light colour, so that they may reflect and not absorb light. Red and violet hangings are proscribed on this account, and also because they are not favourable to the complexion of people. Orange, also, is too fatiguing and intense. We may here enumerate some of the most suitable colours for hangings, and it may be remarked Chevreul and other great colourists scarcely ever adopt simple or bright colours for such purposes. The light tones of green and blue combine well with mahogany furniture, and other reds and yellows. They are favourable to the complexion, from the pale to the rosy, and contrast harmoniously with gilding. Light-blue is a simple colour that may be employed. It contrasts well with pale complexions and with gilding, while it associates well with mahogany or orange-coloured woods. It is, perhaps, a colour more adapted for small rooms (being a retiring one) than warmer tints. Pre-

ferable to these colours, however, and equally varied in their numerous combinations, are greys, either normal, green, blue, or yellow, either upon a white ground or vice versa, the pattern being equal in extent of surface to the ground; or an assortment of two or more tones of the same or near scales in which the law of contrast or analogy is observed. These combinations of greys and tones of grey are now admitted to be in accordance with correct taste, and it is highly pleasing to see our recent wall-hangings—as those manufactured by our best houses, as Messrs. Jeffrey and Co., Jackson and Grahams Collinson, &c.—exhibiting these selection, and assortments of tint and tone. We have every conceivable hue and shade of grey, from the coolest to the warmest, as bluish greys, olives, russets, citrons, &c.

In domestic apartments it should invariably be kept in view that a wall-paper, unless, indeed, it forms the only wall decoration, should form a background, and, therefore, should not draw attention to itself. Therefore, all strong contrasts of colour, tone, or form should be strictly avoided. Owen Jones observes, in one of his treatises, that the colour should be so broken over the surface as to give a "general negative hue, rather than masses of positive colour." The same subordination of positive colours should be observed in carpets. The ground of a carpet is best of a quiet negative hue, so as to support and throw out by contrast the furniture. Owen Jones, whose designs for carpets always display such an exquisite charm of quiet colour and subordination of form, says carpets should be low in tone and incline to the tertiary hues, the forms or pattern being in the darker secondaries, and the primary colours, or white, if used at all, confined to small quantities, to enhance the tertiary hues, or to express the geometrical bases that govern the pattern. This rule is of paramount value, and would lead us to prefer greens, greys, and drabs of retiring or warm colours, as best harmonising with the furniture or more suited to the size and light of the room. It may be generally observed that the cool and retiring greys are best in small rooms, the brighter and warmer in large ones—the cause of the preference being that the bright and warm hues tend to reduce the apparent size of a room. But it would be impossible to make this a rule, as the aspect, amount of light, and purpose of the apartment have also to be considered.

We have next to consider the colour most suitable for a border or dado. Here, again, we have to decide whether the harmony is to be one of analogy or of contrast. Papers of a pure uniform colour, as yellow, green, or blue, are best relieved by its complementary colour. The tone of the borders should not offer too much contrast to the hangings, or the latter would be considerably deadened. If the border is double, or consists of arabesques, flowers, or other imitations, two tones may very well be used; the exterior border or parts may be then of a deeper tone, though of less extent of surface. For harmonies of contrast we may employ the following colours:—

### COLOUR OF HANGINGS. COLOUR OF BORDERS

1. Yellow . . . Violet, or blue mixed with white.
2. Green . . . Red, in all its hues or borders of gilt.
3. White . . . Orange and yellow, as gilt mouldings.
4. Blue . . . Orange, or hues of red and yellow intermixed. Borders of gilt mouldings.

If harmony of analogy is desired, the following may be employed:—

### COLOUR OF HANGINGS. DO. OF BORDERS.

- Yellow . . . Brass or gilt mountings.



COLOUR OF HANGINGS.	DO. OF BORDERS.
White or normal grey	Pearl or steel-coloured grey, intermixed with the colour of ground.
Grey . . . . .	Higher tones of grey, or greys of hues slightly different.
Pure colour and white	Tones of same, or contiguous scales.

When there is a contrast of hanging and border, dados or wainscotings should have a dominant colour approximating to the hangings or border, though darker. The following may be employed:—1. The same as border, but darker; 2. Same colour broken with black; 3. Grey, tinted with colour of the border, and of same or like tone; 4. The complementary of the colour of hangings, if there is no complementary border; 5. A grey, complementary to the hangings, when the border is not complementary to them. The great object is to harmonise the hangings and the dado, at the same time making the intervening border a distinct separation. When the assortment of the colours in the hangings and border is according to contrast of hue or analogy, the dominant colour of a dado may be—1. The complementary of the colour of hangings, more or less broken, and deeper in tone; 2. Grey, complementary to the hangings; or, 3. A greyish colour that contrasts with hangings.

We now come to the ceiling. Chevreul says the cornice of a white ceiling must be light colours, a little varied, and harmonising with the wainscoting or dado; and, according to this writer, the cornice should be regarded as an integral part of the wall. We will speak of polychrome decoration further on. The coverings of chairs and furniture should be complementary to the hangings, and contrast with them and also the dado, which latter becomes a background for the purer tones of the coverings. It is a mistake often seen to blend colours not complementary, though contrastive. We see sometimes yellow coverings against blue hangings bordered with yellow, and of the same tone, the one killing the other completely. In such a case the furniture stuff should be of a much higher tone than the blue hangings. Light wall colour of pure kind, with furniture of a grey, its hue being complementary to the hangings, form a good contrast, and harmonise admirably.

The effect of artificial lighting should be considered; for example, yellow and violet, excellent as a contrast in daylight, lose their beauty and respective hues entirely under a yellow light.

#### STYLE AND MANNERISM.

PROFESSOR WEEKS, R.A. justly remarked the other day, in his Lectures on Sculpture, that there was a more than usual quantity of Mannerism passing for Style in the world of art; that sculptors are mistaking them, and running after peculiarities, and imitating weaknesses belonging to past ages. He might have added architects also in the category. Few of our best-known architects seem to understand the difference between "style" and "mannerism," and we occasionally see a painful straining after peculiarity or picturesqueness, rather than fitness or beauty. The distinction may be defined thus:—Style is the outgrowth of a nation or period—a mirror wherein are reflected the passing ideas and feelings of the time—the expression of the age. Mannerism, on the contrary, is the reflection of individual peculiarity or eccentricities; in Professor Weeks's language, "it is the mirror in which the artist or his period is unconsciously reflected."

Now it may be proved beyond doubt that the decline of a style is in direct proportion to the amount of exaggerated sentiment and caprice it expresses; and further, that a healthy condition of art can be maintained

only when it expresses or reflects the *summum bonum* of the various individualities, wants and feelings of the period—the gist rather than the partial representation of one class or clique. It is clearly the weakness of our salient art thought that the *outré* idea is seized upon, not the conventional or generalised idea. Instances stare us in every street where the authors have shown us their idiosyncracies, rather than the accepted expressions of the age. What could have induced some of our architects to have given us such nutshells of selfish whims and individualities as we often see?

The true exponents of the age are those Gothicism and Classicists who have softened down the prejudices of ultra-Medievalists and Classic revivalists; who have given us a broader view of what our windows, doorways, chimneys, roofs, should be; how our new appliances may be harmonised and brought into character with the lines of our buildings, by such compromises and deviations from precedent and mere cliquism as common-sense will dictate. The war between rival styles, has tended to exaggerate distinctions, and to make more marked the peculiarities of each style. Great common principles of all architecture are violated in this struggle, and truly representative examples are scarcely looked at. We are continually seeing the essentials of good form, outline, proportion, grouping, and good architectural character, sacrificed, and in return for this sacrifice, what do we get? Nothing but mannerism of the grossest stamp, or revivalism of the most servile kind.

We have, hence, two great agencies at work in checking the growth of architecture, namely, *mannerism* or individuality, and *revivalism*. Both are the offspring of decay in art, and the former succeeds the latter. Take the present Gothic school. With what persistency they are working! Their apparent success makes them believe the national taste is with them, or that they fully represent it. Another "style" starts, and why? Because the last has been given us in nauseating doses,—the reaction was inevitable. This last is no more a natural outgrowth than its predecessor, but the public taste must have a change. Call it "Queen Anne," "Re-renaissance," or "Queen Victoria," it is another revival, and revivals must last as long as there is no art. If thought cannot supply the demand, plagiarism must.

It is amusing to hear a new school of revivalists apologise for their appearance, as we do the latest apologists of "Queen Anne." Lately, brickwork has been the catch-word. We are told that we want a simple brick style, and, with considerable ingenuousness, that we must adopt some Continental Gothic, as the brick-work of Venice, or go back to our Tudor times, or to our Jameses, Queen Anne, or Georgian eras. But we have instances in literature. "Johnson did not think in the dialect he wrote," says Macaulay. There was a pompous unbending style about literature, and we are now returning to it in art. *Sic transit gloria mundi*.

#### HOSPITAL CONSTRUCTION.—V.

##### WARD DETAILS AND DIMENSIONS.

HAVING discussed the ward plan as regards general form and distribution of beds, we have now to consider its dimensions. The superficial area per bed is the principal point to determine. The superficial area, allowing for distance between beds and at the foot for attendance, is the proper unit, and not the cubical space, as it is evident the latter is given by the superficial multiplied into the height of wards. The Barrack and Hospital Commission recommend 87 square feet per each bed for the smaller military hospitals. The Herbert Hospital allows about 96ft., the wall-space being 7ft. 4in., the width of ward 26ft. We are told that a superficial area of between 90ft. and 100ft.

per bed may be calculated for the ordinary civil cases in the general wards, rather more being allowed when students attend. Lofty wards are preferred by committees and architects; but above a certain height all is waste as regards the patients. Fourteen feet is considered the proper limit of height, as this is made to depend on the ventilation required by opening the upper portions of the windows, and the avoidance of draughts to patients. A large volume of space near the ceiling is profitless unless free circulation can be obtained; the descent of the vitiated upper stratum should also be guarded against. The height of 14ft., by the area allowed would give from 1,200 to 1,400 cubic feet per bed; and at the rate necessary for renewal of the atmosphere without reducing the temperature this is ample. For operation and other cases a larger superficial area may be given to each bed. The wards of the Lariboisière Hospital have a width of 30ft., but 26 is sufficient; 24ft. is hardly wide enough for the work of ward, though this is the width of wards in small military hospitals. In rooms for single beds the superficial area allowed must be increased so as to give necessary room all round the bed.

We now come to an important point, namely, windows. Sufficiency of lighting is important, so that no part of ward should be darker than others. In some wards, the windows have been placed at the ends, leaving a space in the middle for beds. This is bad, as it affords ill ventilation to the beds so placed. Each side should be lighted equally and a window placed at the end as well. One window for every two beds in the length should be provided. In St. Thomas's and some other recent hospitals one window per bed is given, which is more than is required. It must be borne in mind that a larger quantity of window glass than required (as a large quantity of cubic space) does more harm than good: it cools the air faster than it can be warmed. Streams of cold air always descend from the glass surfaces on the patients in cold weather, and this should be as much as possible lessened. A large extent of glass surface therefore entails a heavier cost for heating, besides the inconvenience of cold currents. It is recommended that the window-cills should be from 2ft. to 2ft. 6in. from the floor, and should extend within a foot of the ceiling. Ward windows cannot be too high for ventilation. This height of window, then, becomes a determined unit, regulating the width of window after the superficial area per bed is decided upon. Now, an area of window space of 24 square feet per bed is considered sufficient. This is the quantum allowed at Herbert Hospital, Woolwich, and at Vincennes great military hospital. Other hospitals provide 30ft. and upwards. Plate-glass should be used to save heat, especially where the windows are not double, as at Herbert Hospital, &c. This is recommended; though we strongly prefer double windows and walls with an air-space between. In the windows this would require two sashes, unless two sheets of glass are inserted in the thickness of the sash.

As regards means of opening windows and regulating the temperature, we prefer the kind of window now being used by the London and other School Boards, and which we recently described, viz.,—the division of the window into sections, the top section falling inwards by means of rods and lever handles. In all cases, however, it is desirable to open the lower sections of the windows at certain times to promote a thorough current of air. It may be more desirable to divide the window longitudinally, so that smaller transverse opening casements could be provided; but it will be found that a proper contrivance for opening sashes or casements is all that is needed to insure the greatest delicacy of adjustment.

We have yet to speak of the distances between the beds along the walls. Allowing 3ft. wide to each bed, and a space between of



3ft., which is the least that should be adopted, we have 9ft. as the wall space for a pair of beds, and therefore 9ft. would be the width of wall-pier or space between two windows. As we have said, the window width must be regulated by its height, though an intervening space of at least 5 or 6ft. should be provided between every two piers.

The walls of wards should be finished in the plainest manner. No ledges for dirt or dust should be left; no timbered roofs or cornices where any organic matter can lodge. In surgical wards any displacement of such organic matter would be serious. The plastering should be in Parian, or with some non-absorbent material which would not require scraping or whitewashing. A scagliola surface has been used in some cases; but even this, we are told, is absorbent after a time; so is a polished painted surface. A cement is required that will admit of frequent washing with soap and water, or with a slight addition of Condy's disinfecting fluid, and Parian, or some similar cement, is the best that can be adopted. The floors, too, require to be even, of dense material, with no open joints in which matter may be deposited, and it is more necessary to be particular about this than the walls. Oak is recommended, with well-filled joints, the surface of floor being smoothly finished with beeswax, and polished when necessary instead of washing. All that is required is to keep them free from dust and other impure matter by sweeping or sponging, and afterwards polishing. We should certainly prefer oak but for its expense. Pine floors, oiled and varnished, form a good substitute. Cement or tile floors would be too chilly and conductive of heat and cold, or would be the best in other respects.

We now come to sanitary arrangements. Our readers are pretty well acquainted by this time with the form and arrangements of a ward plan, and it will be noticed in the general plan we gave a few weeks since that the end of each ward had its angles slightly projected to form lobbies, between which is placed the centre window of ward. The water-closets and slop-sinks occupy one of these angular projections or towers; the baths and lavatories the other angle, taking care to place the water-closets on the leeward side, so that prevailing winds should not waft any effluvia towards the ward. The water-closets should be arranged round or along the extreme end of the angle projection or tower, a row of narrow lights and ventilators being above the seats. Sheringham's ventilators may be used here and there. In designing these projecting conveniences, care should be taken to interpose the lobby entering from the ward between the water-closets and ward doorway, this lobby being ventilated on the outside, so as to completely intercept all effluvia. In our next and concluding article we will allude to the sanitary details generally.

## HISTORIC ART STUDIES.

ITALIAN, GERMAN, AND FRENCH SCULPTURES OF THE SIXTEENTH AND SEVENTEENTH CENTURIES.

(With Double-page Illustration.)

THE division of labour has produced great results in modern times. The neglect of general knowledge has degraded our works of art to mere products of industry. To our mistaking industry for art, many of the shortcomings in our artistic products are due. Ingenuity is the element of industry, whilst the basis of art is genius. Hard work, correct study, and indefatigable practice may produce a master in works of industry; technical skill prevails in them, and this skill may be attained by diligence and perseverance. Art requires all the qualities of industrial work, but, at the same time, calls for much more. An artist, besides genius and technical skill, must have

a generally-cultivated mind; there is no branch of knowledge that he ought not to be acquainted with. Phidias must have been as great a painter as he was a sculptor and architect. The same was the case when Leonardo da Vinci and Michael Angelo revived art. Acquainted with the different branches of art, well trained in the Classics and all that constitutes a liberal education, the painters, sculptors, and architects of the Renaissance period practised their eyes and hands; they carved, modelled, learnt architecture and painting, and, in addition, cultivated their minds through a thorough study of poetry, history, and philosophy. The spiritual part of a work of art is its principal essence; the technical is secondary. Without this apophthegm, art is an impossibility. The idea pervading any artistic composition stamps it as a work of art. The materials—marble, bronze, wood, canvas, colours, &c.—are only accidental parts. The sculptor must know all the effects of light and shade, and the painter must be able to model round forms on the flat. The architect, again, in using sculpture and painting for the embellishment of his building, ought to be a competent sculptor and painter, at least theoretically. A sculptor who, like B. Lorenzi, should erect a monument to a genius like Michael Angelo, must reflect in his work the spirit of the man whom he seeks to glorify. The statue of Sculpture by Lorenzi (see Fig. 1), from the tomb of the immortal artist, bears out our assertion. Sculpture is represented as a powerful woman, with a dreamy but determined face, and is especially good because it is conceived in a poetical spirit. The monument was erected in the Church of St. Croce at Florence six years after Michael Angelo's death, which took place in 1564. Giovanni da Bologna, though a Netherlander, was trained in the spirit of the Southern School of Art, and also worked in the style of revived Classicism. The Rape of the Sabine Women (see Fig. 2), in the Loggia de' Lanzi at Florence, is a masterly group in marble. The composition in the harmony of its lines is very elegant; the expression of despair in the conquered male, and of indecision in the half-yielding, half-resisting woman, is rather mannered, but decidedly effective. The bronze statue of Cosmo I., by the same artist, has been mentioned in our Historic Art Studies (See BUILDING NEWS, July 3, 1874). Classical in conception and execution is his Mercury (See Fig. 3). Vigorous reality is united in this statue with the highest poetical ideality; the swift messenger of the gods appears to rise into the air. Motion and repose have scarcely ever been more admirably combined than in this figure. The only mistake is in the bronze head of the Zephyr, who apparently balances the god on his lips; there is a forced allegory in this idea, and the result is inartistic, and destroys the general grace of the composition. The tomb of Pope Paul III. in St. Peter's at Rome, by Guglielmo della Porta (see Fig. 4) is in composition and execution a mere reproduction of the monument erected in memory of Lorenzo and Giuliano Medici (see BUILDING NEWS, August 7, 1874), by his master, Michael Angelo. Above the Sarkophagus is the Pope enthroned, in bronze; under him are two female figures in white marble, the one representing Justice, the other Prudence. The one is said to bear the features of the Pope's mother, and the other the face and figure of his sister-in-law Julia. Two similar figures are in the Palace Farnese at Rome. The nude Prudence had formerly a bronze dress; the more depraved an age is, the more hypocritical it becomes, and pretends to be ashamed of its statuary. Bartolomeo Ammanati (1511—1592) was one of the less fortunate imitators of Michael Angelo. He tried to be powerful, but succeeded only in being clumsy. His most celebrated work is the fountain on the Piazza del Granduca at Florence, from which we give a Neptune, a female, and a male figure (See Figs. 5, 6, and

7). Not less than six sculptors competed for the work. Amongst them were Ammanati, Giovanni da Bologna, Benvenuto Cellini, and Baccio Bandinelli; the latter was entrusted with it, but he died when the marble blocks had been cut according to his arrangement. Ammanati received the work after him, and tried to use the marble as well as he could. Of one single piece he made Neptune (see Fig. 5) standing on a shell, drawn by four sea-horses; the basin he ornamented with four sea-gods—Thetis, Doris, Nereus, and Proteus, accompanied by Satyrs and Fauns. The composition, both in general and in detail, is forced, incongruous, and heavy. The artist struggled to use another man's material, and fell into a lamentable mannerism. He was even worse than Bandinelli, who tried, as all imitators do, to catch Michael Angelo's technicalities, for he even failed in this. The two divinities, Thetis and Nereus, are stilted and monotonous (See Figs. 6 and 7). Both he and Bandinelli were spiritless imitators of the degenerated Roman style, characterised by small heads and powerful limbs, and of Michael Angelo's composition. Italy at this period swayed art everywhere. Even the North had to bow to her influence. As there was a time when every learned man had to add an "us" to his name in order to be credited with some knowledge; Heise becoming "Heisius," and Reimar a "Reimarius," so at this time artists' names were rendered Italian. The simple Netherlander, Peter de Witte, corresponding to our "Peter White," was called Peter "Candido." With his Italianised name, he was allowed to try what he could do at painting, architecture, and sculpture, and to construct, in the Lady Church at Munich, the monument of the Emperor Ludwig, the Bavarian, erected to his memory by the Elector Maximilian, and finished in 1622. The gravestone is surmounted by a rich but overdone sarkophagus, on the top of which four allegorical figures of Wisdom and Valour watch over the Imperial crown; angels holding shields, and four stiff warriors with standards, are on the corners. The two statues of Albrecht V. and William V. are worked with an almost touching naturalism and great technical skill. We give that of the former (see Fig. 8). The ideal was neglected by these northern artists, and their products look heavy and vulgar. Though we may admire their accuracy in reproducing in bronze, hair, fur, frills, embroidery, and the hilt of the sword, the very attitude of the statue is commonplace. The founder, John Krumpter (or, according to others, Hans Kreuzer), really deserves the highest praise. It is indeed a poor art when the framemaker stands higher than the painter. This must be the result whenever the "idea" of the artist is thought little of, whilst the man who deals with the substantial "material" is everything. Art only becomes a civiliser, and powerfully influential, grand, and universal, when its mental element is cultivated—when the artists rise above vulgarity and mere technicality, and, educated themselves, to elevate, through their genius, a period, and through the period the whole world. All art that is not universal, and has its little peculiarities of hatred of symmetry, or contempt of proportion, or love of incongruity (falsely called originality), or predilection for incorrectness, is no art in the highest sense. Homer, Æschylus, Phidias, Virgil, Dante, Shakespeare, Leonardo da Vinci, Raphael, Michael Angelo, Molière, Schiller, and Goethe, are neither Greek, nor Roman, English, French, or German; they are *human and humane*—they are not specialities, but universalities; they rise above incidental national peculiarities and belong to all nations and to all ages. The "Rape of a Sabine Woman" (see Fig. 9), by the Netherlander, Adrian de Vries, is a speciality, and certainly never will be considered a genuine work of art. The muscular element and a broad Dutch vulgarity predominate in this Roman "prize-fight." In comparing this group with that of



Giovanni da Bologna (Fig. 2) we see that the same subject may be treated poetically, as well as in a matter-of-fact style. Though the anatomy of the Netherlander is more correct and better expressed, the Italian group is of much greater artistic value, because it is more graceful and ideal. Goldsmiths and silversmiths always abounded in Germany, and we have before mentioned the reason of this. Amongst them Wentzel Jamnitzer took a very prominent position. He could boast of having been the goldsmith of four mighty German Emperors, of Charles V., Ferdinand I., Maximilian II., and Rudolph II. The bronze relief which we give, Fig. 10, adorns his tomb at Nuremberg; it is overcrowded in its details, not without some merit, but as a whole tasteless; the one medallion contains the artist's portrait and the other his crest. The Four Elements serving Art in his products are represented as delicate female figures occupying the four corners. Full of grace is a silver centre-piece by the same artist, formerly kept in the Townhall at Nuremberg, but now in the possession of the family of the Merkels. Of this we give the central figure, representing "Earth" (See Fig. 11). The southern Aryan Spirit, from the shores of the Ganges, appears in the voluptuous forms of the figure, round which the transparent dress is artistically wrapped in many folds. The artist gives the form of the "Mother of All," bearing fruits of all kind; and unconsciously his pantheistic idea takes an Indian form. Prosy, and rigidly respectable are James Gladehals's medallions, with the portraits of the Markgraf George of Brandenburg and his wife Elizabeth (see Figs. 12 and 13). Of Jean Goujon (see BUILDING NEWS Aug. 14, 1874) we gave several works, the two Satyrs (see Fig. 14), conceived in a bright spirit of tasteful conventionalism, adorn the richly-decorated staircase of Henry II. in the Louvre. Two allegorical figures, by Barthélemy Prieur, representing Horticulture and Agriculture (see Figs. 15 and 16), are taken from spandrels ornamenting the Infanta windows in the Louvre. Ornamental art was and is still the great forte of the French; they at least very rarely offended through tasteless over-decoration, though this cannot be said of their modern buildings. Very modest, but at the same time extremely cold and spiritless, are the Three Graces, by Germain Pilon (See Fig. 17). They were made to carry an urn containing the hearts of Henry II. and Catherine de Medici. The heads are very dull and without any higher expression; whilst the drapery is singularly artificial, but by no means artistic.

The charming Indian legend of Krishna and Dahana, the Greek Apollo and Daphne, gave Lorenzo Bernini the subject of one of his best groups, now in the Villa Borghese at Rome (See Fig. 18). Six Popes passed away, and Bernini still remained the infallible master in arts. But his infallibility was a mere delusion; he was dazzling, pompous, effeminate, rough, and licentious in his works. He was endowed with genius, but degraded it to ingenuity. The ideal and low naturalistic impulses were at war in his mind, and to please his masters and the depraved artistic tendencies of his times, he allowed the sensual to become master of the ideal. Pope Urban VIII. and Louis XIV. of France were his patrons. His masters were hollow and boastful, and the works of their favourite servant were licentious and pompous. Even the works of a Praxiteles are chaste in comparison with those of Bernini. He endeavoured to be anatomically as coarse as possible, and at the same time strives to excite the mind to evil passion by his refined and intoxicating voluptuousness. To gratify the senses was his aim, and it is no wonder that he became a model of the depraved taste of his times, and even polluted the minds of sober northern artists. When cardinals condescended to praise in verses the powers of an artist, how was the cold and calculating

art-critic to make himself heard? Yet we cannot too strongly protest against an art that strives to gratify the senses without elevating our moral nature. The sensuous is not the beautiful. The coquettish Daphne, the wild look of Apollo, are contrary to the spirit of the allegory—the Sun in his majesty pursuing the morning Dawn in her pure freshness. The ideal is trampled under foot, and has been degraded to express a tale of every-day sensualism. These remarks apply with even greater force to his "Rape of Proserpine by Pluto" (see Fig. 19), now in the Villa Ludovisi. We have heard the representation of the pressure of Pluto's hand on the soft flesh of the sentimentally resisting Proserpine rapturously praised. Did it never occur to these ignorant admirers that such pressure must have left a blue mark on the spotless body of the fair daughter of Ceres? Is art to awaken such ideas in us? Bathsheba bathing, Lot with his Daughters, Potiphar's Wife and the flying Joseph, were favourite subjects with the painters in the time of Bernini, who concentrated, both in his profane and sacred sculptures, all the evils of which a depraved art is capable. St. Theresa in Ecstasy (see Fig. 20) in the Church of St. Maria della Vittoria, at Rome, is one of the most objectionable compositions of this master. Theresa lies on clouds, as on a couch, with outstretched limbs; her eyes are not closed in pious contemplation, but in earthly rapture; and the beautiful angel with his dart in his hand, in spite of his wings, is more heathenish than an Apollo or a Bacchus. "St. Cecilia," by Stefano Maderno (see Fig. 21), is a beautiful woman with her face hidden, lying dead on the ground, exhibiting the rounded forms of a Venus, dressed in artistically-arranged drapery. Despite the union of Antique and Christian forms and ideas, the work is less objectionable than those of Bernini. Grand in composition is the bas-relief of Alessandro Algardi, representing Pope Leo and Attila. The execution is pictorial. The relief consists of five marble plates joined together. The perspective treatment is exaggerated; the servant kneeling by the side of Leo and Attila are nearly detached from the ground, and threaten to fall forward. A "tour de force" in sculpture is as bad as one in painting or architecture. We called the composition grand, because the whole arrangement is taken from Raphael's great fresco, representing the same subject. Not everything making an excellent picture makes a good relief. The statue of St. Susanna (see Fig. 23) in the Church of Maria di Loreto, at Rome, by the Netherlander François du Quesnoy, called "Fiammingo," is one of the most beautiful of this artist's works. He lived at Rome, but his northern nature saved him from imitating altogether the depraved style of Bernini. Like a Juno, the Saint stands, proud in her humility, and humble in her piety. The drapery is exquisite, in a good Classic style. Wheneversensationalism flourishes, it is sure to find in a French artist a powerful votary. Legros was not only an imitator of Bernini, but exaggerated all his faults, as may be seen in a group from the Church del Gesù, at Rome, decorating the Altar of St. Ignatius. "Faith and Heresy" (see Fig. 24), were the subjects of his chisel. Faith, a young woman, holding a book and a cross in her left hand, hurls the lightning of anger and hatred against an old woman and a falling middle-aged man. Faith is helped by an angry looking little boy, who appears to tear up the leaves of Calvin's and Luther's writings—serpents coil around the heretics. Composition and execution are equally objectionable. Hatred can never be the element of art. St. Bruno is a quiet unpretending statue (see Fig. 25), by another Frenchman, Jean Antoine Houdon, who worked with great zeal, in a simple, graceful style, in decorating the Church of St. M. degli Angeli, at Rome. It represents the founder of the order of the Carthusian monks. A poetical quietism per-

vades this work; the Saint stands, lost in contemplation, and appears to whisper the words "Memento mori." The contrast between this statue and Bernini's St. Theresa is striking—but in ecclesiastical art the transcendental is often found side by side with the most realistic. G. G. ZEEFF.

#### LEICESTERSHIRE ARCHÆOLOGICAL ASSOCIATION.

THE general meeting of the members of this Society was held on Tuesday and Wednesday, last week, at Leicester. We are indebted to the *Times* for the following report:—

The first day was devoted to a gathering in the old Guildhall, under the presidency of the Mayor, Mr. W. Kempson. At the morning meeting a local paper, contributed by Mr. T. North, on "The Pates of Eye, Kettleby, and Lysonby," was read, and an inspection of the five old churches of Leicester—St. Martin's, St. Mary's, St. Nicholas's, All Saints, and St. Margaret's, was made. After dinner Mr. James Thompson, a local historian, conducted the members to the Jewry Wall, Wyggeston Hospital, the Castle, and Trinity Hospital, and at the evening meeting contributed a paper on "The Rolls of the Mayors of Leicester."

Wednesday was devoted to an excursion to the churches of Syston, Rearsby, Gaddesby, Ashby Folville, Twyford, Queenborough, and Barkby, the guide being Mr. M. H. Bloxam, of Rugby, the author of several archaeological works. Syston Church was described by Mr. Bloxam as a good specimen of a village church. It consists of a tower, nave, north, and south aisles, and chancel. The nave is of the fifteenth century; four arches on each side separate it from the aisles. These arches are pointed, and, like the octagonal piers from which they spring, are peculiar. The arches also are panelled in front, and have hood-moulds over them. The wooden roof of the nave is a good example of the fifteenth century, the clerestory windows, four on either side, have depressed four-centred arches, filled with the common vertical tracery of the fifteenth century. The font is plain, and octagonal in shape. In the south wall, at the east end of the south aisle, is a piscina, indicative of an altar placed against the east wall of this aisle. The chancel is a structure of the fourteenth century; on the south side are three sedilia, under plain pointed simply chamfered arches, without hood-moulds, springing from cylindrical shafts with moulded bases and caps. In the north and south walls of the chancel, westward, are low-side windows. In the north wall of the chancel is a plain triangular-headed locker or aumbry. In the south-west wall of the chancel is a hagioglyph or perforation, through which the elevation of the Host might be observed by those in the south aisle. The arch dividing the chancel from the nave is panelled; on the north side is the rood-loft door, access to which has been from the north aisle, up steps. The vestry, which is a modern addition, on the south side of the chancel, contains the ancient weather-cock of copper. The tower arch is very fine, and, together with the piers or responds from which it springs, is panelled. In the north aisle is a modern wall painting, which Mr. Bloxam considers extremely good; it is of the modern German school. On the exterior the tower may first be noticed. This is of the fifteenth century. The west door is square-headed, with a pointed window above. The belfry windows in the upper story are good; and beneath the parapet is a horizontal band panelled in four foils; the base moulding is bold and good. High up, on the south-west buttress, are three sculptured heads, two male and one female. The east window of the chancel is plain, of the fourteenth century, pointed, with the mullions simply crossing in the head. The wall of the south aisle has been rebuilt, but a fine sepulchral arch of the fourteenth century, with a plain pedimental canopy, has been carefully rebuilt into it. Beneath this are the remains of a stone coffin and lower portion of a sepulchral slab, with the base of a cross. Such monuments in the external walls of churches are occasionally to be met with.

On entering Rearsby Church, Mr. Bloxam stated that the approach is over an ancient pack saddle bridge, of seven arches, somewhat acutely pointed, of plain masonry, without ribs under the arches. This bridge, which is only 4ft. in width, may be of the thirteenth, is certainly not later



than the fourteenth, century. The church is of the fourteenth and fifteenth centuries. The doorway of the north aisle may possibly be of the thirteenth century. The south porch is modern. On each side of the nave are four plain pointed arches, with chamfered edges, springing from octagonal piers with moulded bases and capitals. These are of the fourteenth century. In the south wall of the south aisle, near the east end, is a piscina trefoiled in the head, with a hood-moulding over. This is of the fourteenth century. The south wall of this aisle is of that period. In the south wall of the chancel are three sedilia beneath plain pointed arches with hood mouldings over. These are of the fourteenth century. Eastward of these, in the same wall, is a piscina of the same period. In the north wall of the chancel is a square ambry or locker. The windows of the chancel are later insertions of the fifteenth century. The doorway on the south side, and the tower, are also of the fifteenth century. It contains no west doorway. The west window is of two lights, and the tower is finished with an embattled parapet. In the churchyard is a slate tombstone to the memory of a former incumbent, Cleare Sacheverelle, rector of Rearsby, 1660. The font is very clearly a relic of a former church, because it is of the thirteenth century.

Gaddesby Church came next, and this, Mr. Bloxam said, is one of the finest, if not the very finest church, or rather chapel, in the county of Leicester, and is deserving a very minute examination. It is of that period, the fourteenth century, in which Mediæval art, both in architectural and sculptural design, had attained the highest perfection. The tower and spire are most elegant. The west end of the south aisle is an exceedingly rich Decorated work. It contains a doorway with numerous arch and jamb mouldings, with a hood moulding. Over this is what is called an ox-eyed window, composed of three segments of circles, richly moulded and crocketed in a peculiar way. On either side of this window is a rich ogee-headed niche, surmounted by a pedimental canopy and enriched with crockets and a finial. Above this window is a niche similarly designed. In a buttress at the south-west angle are rich canopied niches. The parapet is embattled with a sculptured frieze beneath it. On the south side of the south aisle westward is a Decorated window, despoiled of tracery. Three buttresses with canopied niches, and an embattled parapet with a sculptured frieze beneath, are the most prominent external features of this, the westernmost part of the aisle. The easternmost part of the aisle is of the design of the fourteenth century. The east window is Transitional in style of the latter part of the fourteenth century. The north aisle has a doorway in the centre of the north wall, and the doorway an ogee canopy. It has numerous architrave mouldings with hood-mouldings over, and shafts at the jambs with caps and bases. On each side of this doorway are two rich windows, with Decorated tracery. Over the buttresses are gargoyles. The parapet of this aisle is embattled with a hollow cornice-moulding beneath, in which the ballflower is inserted at intervals. The east window of the north aisle is very rich. It is filled with Decorated tracery. At the jambs are shafts, and over it is a hood-moulding. The base-mouldings of this aisle are good. The chancel is lighted on the south side by a plain Decorated window of the fourteenth century, the mullions of which cross on the head. Eastward of this a fifteenth century window has been inserted. The north side of the chancel is lighted by two fourteenth-century windows, the mullions of which cross in the heads. The east window of the chancel is plain fourteenth-century work, consisting of five lancet lights, the heads of which are plain, and not foiled. Externally, we have in this church the richest features of the fourteenth century at the west end of the south aisle, rich features of the fourteenth century in the north aisle, and plain features of the fourteenth century in the chancel, with one window of later work inserted. The church contains one sculptured recumbent effigy. It represents one in armour, his head bare and his hair clubbed or cropped close, resting on a tilting helm. To his breast-plate are attached angular-shaped tuilles, beneath which is an apron of mail. The shoulders are protected by pauldrons, the upper arms by rerebraces, the elbows by coudes, and the low arms by vambraces, all of plate. The nether limbs are protected by cuisses, genouilleres, jambs, and broad-toed solerets, the latter, together with the

treatment of the hair, showing this effigy not to be of earlier date than the reign of Henry VII. On the right side is an anelace or dagger; on the left a sword affixed to a narrow belt crossing the body diagonally. The feet rest against a lion. This is placed on a high tomb, the sides of which are embellished with quatrefoils inclosing shields. Close to this is a sepulchral slab, with incised effigies of a man in armour and his wife. This is somewhat earlier than the sculptured effigy, and, from the long-necked spurs, may be assigned to the reign of Henry VI.

Ashby Folville Church was said to consist of a tower, nave, north and south aisles, and chancel, and is partly of the fourteenth and partly of the fifteenth century. The nave is separated from the aisles by five arches on the south, and four arches on the north side. These arches and the piers from which they spring are of the fifteenth century. The roof of the nave is a good specimen of the fifteenth century, but the angle of the roof of the earlier nave is still visible. The clerestory windows are also of that period. The north aisle is of the fourteenth century; the west window is of the Decorated style. The north doorway is of the Decorated style of the fourteenth century. At the east end of the north aisle, a fifteenth-century window of three lights beneath a depressed four-centred arch has been inserted. The south aisle is of rich Decorated work of the fourteenth century. The west window of this aisle is of the Decorated style; it has been blocked up with brickwork, and requires careful restoration. The south aisle doorway is of the Decorated style, and rich in composition. In the east wall of the south aisle, a wall which separates it from a sepulchral chapel, is a piscina, close to which, southward, is a door leading into the chapel. The chancel contains a plain piscina in the Decorated style at the east end of the south wall, and at the west end of the south wall, in the chancel, is a sepulchral arch over this, and from the north aisle is an hagioscope or squint. The lower portion of the rood-screen between the chancel and nave is existing. It is of rich panel work of the fifteenth century, painted. The entrance to the rood-loft is from the north aisle in the south wall eastward, and the doorway to the rood-loft is up above. In the east wall of this aisle is a hagioscope, enabling those in this aisle to view the elevation in the chancel at the high altar. Also, we have an ancient stand of the seventeenth century for an hour-glass. In the north aisle on the pavement is an ancient altar-slab, with the five crosses incised upon it. The font is Norman, a relic of a former church, and square in form. In the north wall of the north aisle near the east end is an ambry or locker, with a depressed four-centred arch. Some plain sittings of the fifteenth century still remain. Part of the west end of the south aisle is separated by a seventeenth-century screen. In the chancel is a sepulchral slab, on which is incised an emaciated body in a shroud, with whelps at the feet, and this is of the date of 1470. Eastward of the north aisle is a mortuary chapel, divided from the chancel by a fourteenth-century arch. This chapel contains on the south side a high tomb, the north side of which exhibits three shields within quatrefoils. On this tomb lies a recumbent effigy in armour, apparently of the latter part of the fourteenth century. Eastward of this effigy in the south wall is a piscina. Two other monuments are in this chapel, one beneath a canopy resembling a tester bed, the other without a canopy, and both are of the seventeenth century. The south window of this chapel is in the Decorated style, square-headed, with a hood-moulding over, and the ball flower inserted at intervals in a hollow moulding.

Twynford Church, Mr. Bloxam explained, was smaller than the other churches visited, although not without its interest. It is of three periods. In the arcade which divides the north aisle from the nave they had the Early English. The semicircular arches were Early English work, which differed from Norman work in many respects. There is a good roof of the fifteenth century, also a side aisle of the same period. Outside there was visible masonry of the fourteenth century. The windows are very good of their kind. In the chancel there is a low-side window on the north side, which was originally the confessional window. The tower was of the fifteenth century. The font was of especial interest, being of thirteenth-century work, and coeval with the arcade range of pillars. The church combined sculptured work of the fourteenth century, as shown by the dog-tooth mould-

ing. There was a statement that this church was built by the same person who built Oakham Castle and that at one time it was struck by lightning and burnt down. In corroboration of the latter, he could say that when the church was recently restored they found a good deal of molten lead and burnt bricks. Mr. Bloxam had no doubt there was a church on the spot prior to the present structure. On looking through the register, Mr. Bloxam found that the earliest bore the date 1558. Outside was noticed the embattled tower of Ashley stone, which was stated to have been built when the windows were inserted in the older walls. On the face of the tower are a number of niches, in one of which is the figure of St. Andrew, the patron saint of the church, and a number of shields, with armorial bearings, supposed to be the arms of donors to the church. Another interesting feature pointed out was the church clock, the original clock of the old Leicestershire Exchange, in the market-place.

From Twynford, the party proceeded to Queensborough Church. Mr. Bloxam said that this church had passed through four periods of architecture. There was in the chancel, in the north wall, a Norman window. The arches and piers were of the thirteenth century, while the chancel wall was of the fourteenth century. The windows of the aisles were of the latter period, as also the walls above the arches and arcade, clerestory, and windows. The roof was of the fourteenth century, and the original pitch of it was seen against the tower. The tower was a most elegant structure of the fifteenth century, with crocketed spire. On the south side there were the remains of a piscina, showing that an altar must have been there formerly. There were in the chancel a brass dated 1634 and a fine north doorway. The chancel arch was the original entrance to the "rood-loft," and underneath a curious tablet of the sixteenth century (date 1586), to the memory of Joacms Seagrave. In the south wall of the chancel was a piscina of the Decorated period; also a locker in the north wall. There were traces of Norman work in the chancel arch, showing that stones of a former period had been used in the structure. The lower part of a low window on the south side of the chancel was pointed out as having been blocked up with slabs of stone, and which was originally the place where the priests heard confession. The other parts of the church were modern, although the ancient features had been well preserved. The church was further stated to have been of "respectable antiquity," the register, which was produced, being found to date from the year 1562.

Barkby was the last place visited, and at the entrance to the church the excursionists were met by the vicar, the Rev. E. Pochin. The edifice was still found to be undergoing restoration, workmen being employed in scaling the plaster from the chancel walls, where they had discovered two low-side windows. These were stated by Mr. Bloxam to have been used for confessional purposes; they bore traces of staples and wooden window shutters. This church was pronounced as of one period throughout, and appeared to have been built in the fourteenth century. There was a tower with broach spire, which was very good; also a very fine nave, with arches and piers bearing some exceedingly nice mouldings. There was a good piscina in the chancel, containing the original oak shelf on which the sacramental vessels were put; also a locker on the north side. The chancel arch was Plain Decorated, but of recent restoration, and there was above the arch what very few churches had—a window; it was very rare. The register was found to date from the year 1586.

The alterations which have been carried out during the summer in the parish-church of Towcester are now nearly completed. The pillars, arches, jambs, and mullions of the windows, the porches, and the doorways have been scraped, the stonework being repaired where decayed. The western arch and wall have been entirely scraped and restored. Two of the windows in the north aisle have been renewed, and reglazed to correspond with those renewed in the chancel two years ago.

Several houses in Vere-street, Clare Market, have been known to be in a dangerous condition, and notice was given to the tenants to quit. On Friday about forty persons went out. On Sunday morning, two of the houses fell. Fortunately, the *débris* fell inward, or the crowded state of the locality on a Sunday morning might have resulted in a loss of life.



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## OUR LITHOGRAPHIC ILLUSTRATIONS.

## NEW CHURCH, LEAMINGTON.

THIS church, of which we gave a perspective view last week, is to be erected in the parish of Milverton, in part from the bequest of a deceased benefactress. The materials are Knole bricks, with dressings of Kenilworth and Bath stone. The dimensions are, externally, about 170ft. by 50ft. across the nave, and the wallplate of the nave and chancel will be about 50ft. from the floor-line. Internally, the double transepts will form an unusual and striking feature; the piers and arches which open into them will rise the whole height of the nave walls. The organ-chamber opens into the north transept and into the chancel. Below it is to be a side aisle giving access to the sanctuary, and also to a large parish-room which abuts upon the church at this point, and is now in course of erection. This room will serve the purpose of a choir-vestry, and the clergy-vestry will adjoin it. The chancel will be arcaded internally, the east-end enrichments rising to the roof, which is boarded to a coved form throughout. The side aisles are to be groined in wood. The vicarage house faces the church, and is nearly completed. The architect is Mr. G. Gilbert Scott, of 7, Duke-street, Portland-place; and the builder is Mr. G. F. Smith, of Leamington, who has already erected the vicarage.

## THE RED HOUSE, BAYSWATER-HILL.

At the last meeting of the Architectural Conference Mr. John J. Stevenson read a paper on the revival of Queen Anne's style, which caused a little commotion amongst architects, several of whom had prepared the way for the discussion by erecting Queen Anne style buildings in London. Mr. Stevenson at once found himself, no doubt unexpectedly, the advocate of a new architectural movement. We have now the privilege of giving an illustration of Mr. Stevenson's work, as exhibited in the Red House, No. 3, Bayswater-hill. We hope to give a few particulars in an early impression of the BUILDING NEWS.

## ITALIAN, GERMAN, AND FRENCH SCULPTURE OF THE SIXTEENTH AND SEVENTEENTH CENTURIES.

For description of illustrations in this double-page sheet see Dr. Zerffi's article, p. 337.

## PRIZE DESIGNS FOR MOUNTAIN CHURCHES.

In 1872 the Church Extension Society of the Diocese of Carlisle offered twenty guineas and fifteen guineas as first and second prizes for designs for chapels in mountain districts. Fifty-six sets of designs were sent in by forty-eight competitors. The designs selected were those marked "In Montibus," the authors of which turned out to be Messrs. Paley and Austin, of Lancaster. A reproduction of their designs we this week give, not being the prize design. Messrs. Paley and Austin, in their description, which was sent in with drawings, said the designs were based to some extent on the old churches which still exist in the hilly and remote districts of Sussex, and which, with the very simplest manner of construction, exhibit a great variety of treatment, and are admirably suited to the character of the country in which they are placed. The sketches which were marked 2 and 3 show how design 1 may easily be varied, both in plan and outline, by placing the tower across the nave instead of across the chancel, and (to some extent) modifying its external design. By this means in all three plans the internal effect would be much increased at a small cost, whilst a small ringing-room and belfry are gained. The arches and pillars supporting the tower have been designed as simply as possible, so as not to obstruct the view of the chancel. The design which was selected shows a more simple form of church, which could consequently be carried out at much less cost. Each church

would be capable of accommodating 100 adults, allowing 20in. for each person, and a width between benches of 2ft. 10in. The specification was supposed to be modified to suit the requirements of particular localities. In one part of the diocese a church would probably be cheapest if slate rock was used for both walling and dressings, while in another, if near a railway-station, freestone for dressings would be cheapest. Dressed stone, however, formed only a small item in any of the designs, as it was excluded as far as possible, and the very simplest type of window adopted. For heating, gill stoves with proper flues were recommended. The cost of carrying out designs would vary to some extent according to the locality; but generally the cost of No. 4 is supposed to be £700, and that of the others respectively £1,050, £1,000, and £900.

## PROPOSED STREET IMPROVEMENTS AT BRISTOL.

THE difficult ascent of Park-street, and the consequent wear and tear of horseflesh and loss of time, are familiar to all passengers from Bristol to Clifton. The Bristol Town Council are at the present time contemplating the execution of a scheme of street improvement at a cost of £102,000, which, whatever other merits it may possess, will not do much to remedy the above-mentioned evil. Mr. T. C. Sorby has, as we briefly stated last week, submitted to the Bristol Town Council a plan which is certainly preferable, and which, moreover, seems likely to pay, at no very distant period, for the cost of its execution. He proposes, first, the formation of a through route from Bristol Bridge to the top of Park-street, about 750 yards long, with a gradient of about 1 in 24 throughout its length, crossing the various streets by girder bridges. Parallel with this route Mr. Sorby would form a second line of street at the normal level, replacing the lines destroyed. The roadway of the high level street would be carried on a series of vaults, and flights of stairs at intervals, giving access to the low-level street, would be provided. The Float would be terminated at New Quay instead of at Stone Bridge, as at present, the drawbridge removed, add the reclaimed land devoted to building purposes. Secondly, Mr. Sorby suggests the continuation of Broad-street westwards, reversing the present gradient so as to obtain a regular rise to Perry-road. The old gateway and church of St. John would remain intact, and access to the gateway and thence to Quay-street would be maintained by a flight of steps. The surface of Park-row would have to be slightly altered to insure a uniform fall from the top of Park-street to Perry-road, thus relieving the gradients of the whole route. St. John-street would be widened so as to bring Broadmead and the St. James's district within the area benefited by the new road. No valuable property would be interfered with at any point dealt with by the last-proposed improvement, and the new sites provided would doubtless be rapidly and profitably utilised. The first improvement would provide a direct and independent route for the railway traffic and that of the districts south of Bristol Bridge; the second a direct and convenient line of road from the centre of the city to the north and west suburbs, which contain the bulk of the residences of the business community of Bristol. The principal merit of Mr. Sorby's plan is the separation, which its adoption would insure, of the two classes of vehicular traffic, favoured as it is by the configuration of the ground. The omnibus, hackney carriage, and all the light fast traffic would naturally pass over the new high-level street, and the low-level would be left for the heavy, slow, goods traffic, which is principally confined to the area contiguous to the Floating Harbour and the Railway Station.

Bristol has done more than any other provincial city within the last twenty years to improve the character, of its street architecture. The new buildings erected are for the most part of good character, and fewer glaring outrages upon architectural propriety and good taste have been com-

mitted than in many other large towns. The adoption of such a plan of street improvement as Mr. Sorby's would offer increased facilities for architectural progress, and at the same time aid the remarkable development of commerce which bids fair, not so long hence, to restore Bristol to its ancient position as the second city in the kingdom.

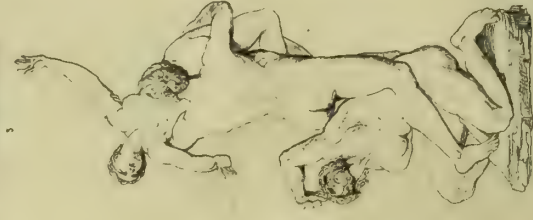
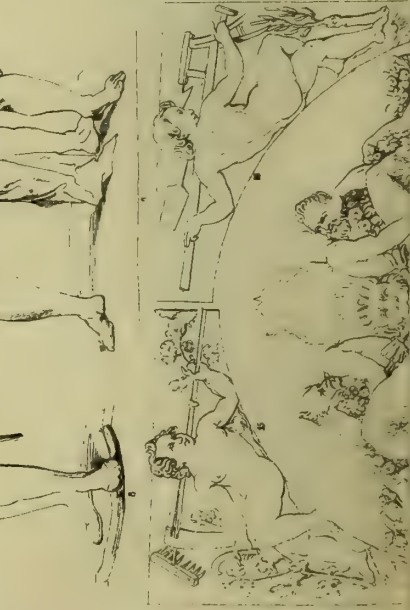
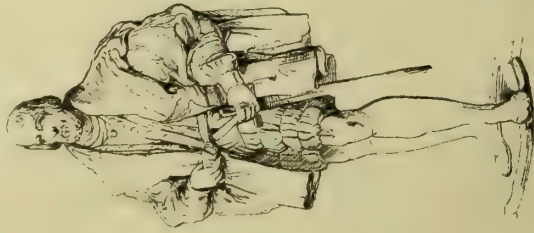
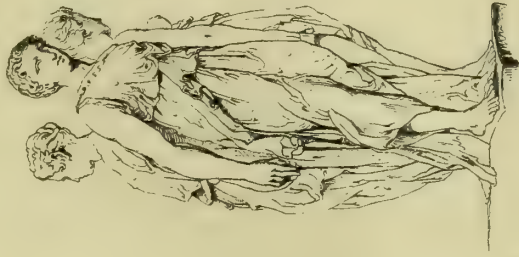
## THE DISPOSAL OF SLOPS IN COUNTRY VILLAGES.

DR. FOX, the medical officer of the combined sanitary districts of Chelmsford, Maldon, and Billericay, delivered an address on this subject in the Public Medicine section at the recent meeting of the British Medical Association at Norwich, in which, after pointing out the difficulty health officers have with the matter, and the danger if the slops are allowed to remain in ditches of creating the most offensive odours, especially in summer and autumn, when decomposition is most rapid, he said: "The Local Government Board is, I believe, preparing a circular recommending Rural Sanitary Authorities to deal with the slopwater of country villages. The Board proposes that each cottage should utilise its slop water on its own garden by passing it through the subsoil in common land drain-pipes fitted with a Field's tank. The tank, in which all the slop water accumulates, suddenly empties itself when full by a syphon arrangement, thus preventing the obstruction of the drain-pipes, which is liable to occur when small quantities of slops are dealt with without its assistance. This mode of disposing of slop water is carried out on a small scale but most efficiently in a portion of my district in Essex. The plan of the Local Government Board, although a very excellent one, is not universally applicable in rural districts. Some cottages have no gardens, or only very small ones. Again, the gardens of some cottages rise from the back doors to their extremities. Moreover, the subsoil irrigation of meadow land is, in my opinion, extremely undesirable, if carried on on an extensive scale among the country villages of our rural districts, as it would probably be attended by an increase in the amount of pulmonary consumption, and of other tubercular affections. Physicians well know the intimate relations between dampness of subsoil and the prevalence of these diseases. Neither is it adapted to villages situated on clayey, non-porous soils. It should also be remembered that the rank grass which is produced by the subsoil irrigation of meadow land with slops is hardly a marketable article, being disliked by farmers, who find that it disagrees with their cattle." He went on to say that having been instructed to write a report on a little country village in his district, where he recommended a dry system of excrement removal, and where the slop water would be rendered very dilute by the admixture of much waste water from a manufactory, he felt strongly that it would be ridiculous to term such a compound "sewage." Knowing the penalties incurred by those who introduce sewage into water-courses, and hoping it might be legal to pass the very dilute slop water of the village into a neighbouring canal, he wrote to the Local Government Board. Dr. Fox, having read the correspondence, added: "This decision of the law officers of the Local Government Board, which seems to have been delivered after the most lengthened deliberation, amounts, in fact, to the permission to pass slops into rivers and streams, provided that in so doing a nuisance is not thereby created. This opinion is based, like so many other legal opinions, on a precedent, and deserves the utmost consideration at the hands of all sanitarians. The hygienic arrangements of many of the towns and villages throughout the country will be doubtless considerably influenced by the decision. I, as a medical officer of health, rejoice at this utterance from headquarters, for a way is now open to me of overcoming the difficulties which in some cases have beset me in my endeavours to discover some feasible and efficient mode of disposing of slop water."













23



18



22



19



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20



24



21



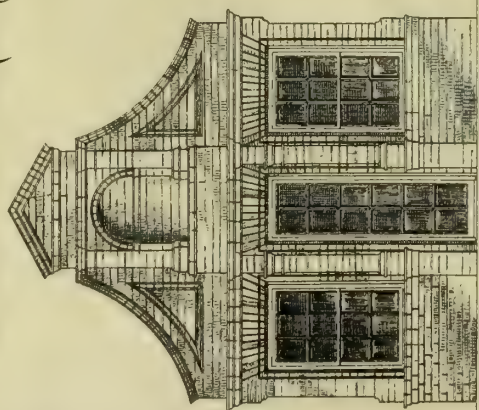








# DETAILS : OF : DORMERS

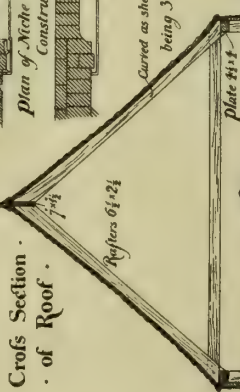


Elevation .

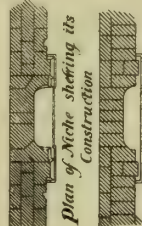


Plan .

Cross Section .  
of Roof .



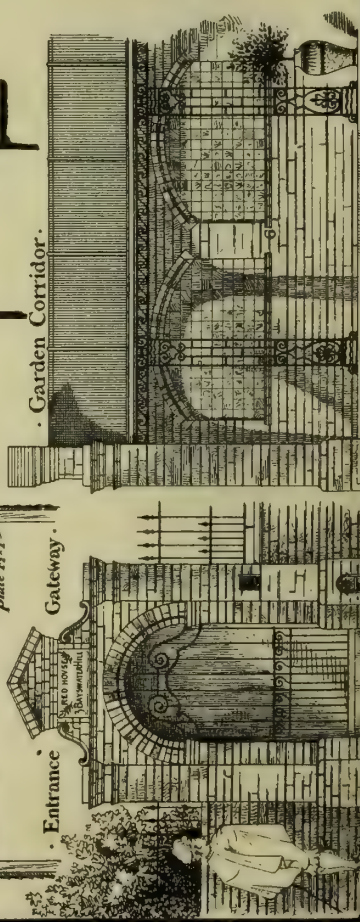
Plan of Niche showing its  
Construction



Shown as seen the thinnest part  
being 31" x 23"

Entrance

Gateway .



Garden Corridor .

pediment .

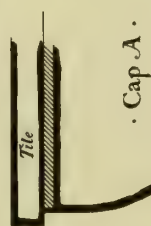


Section .

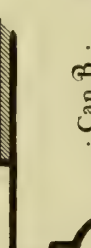
Cap and Arch .  
of Shell .  
F .



Stone Shelf G .



Cap A .



Cap B .

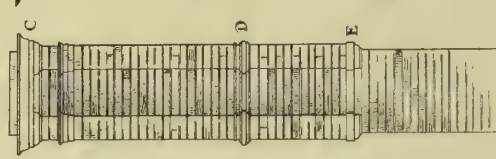
Base A .



Base B .



Chimney Stalk .



String D .



String E .



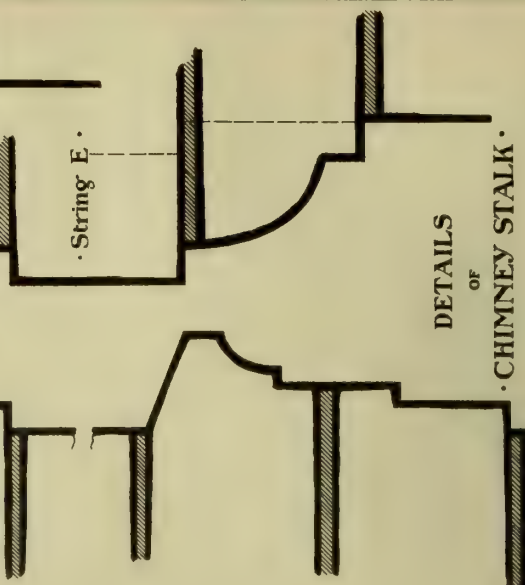
# DETAILS : OF : BRICKWORK

Cornice C .



DETAILS  
OF

CHIMNEY STALK .



Scale of Feet to general drawings

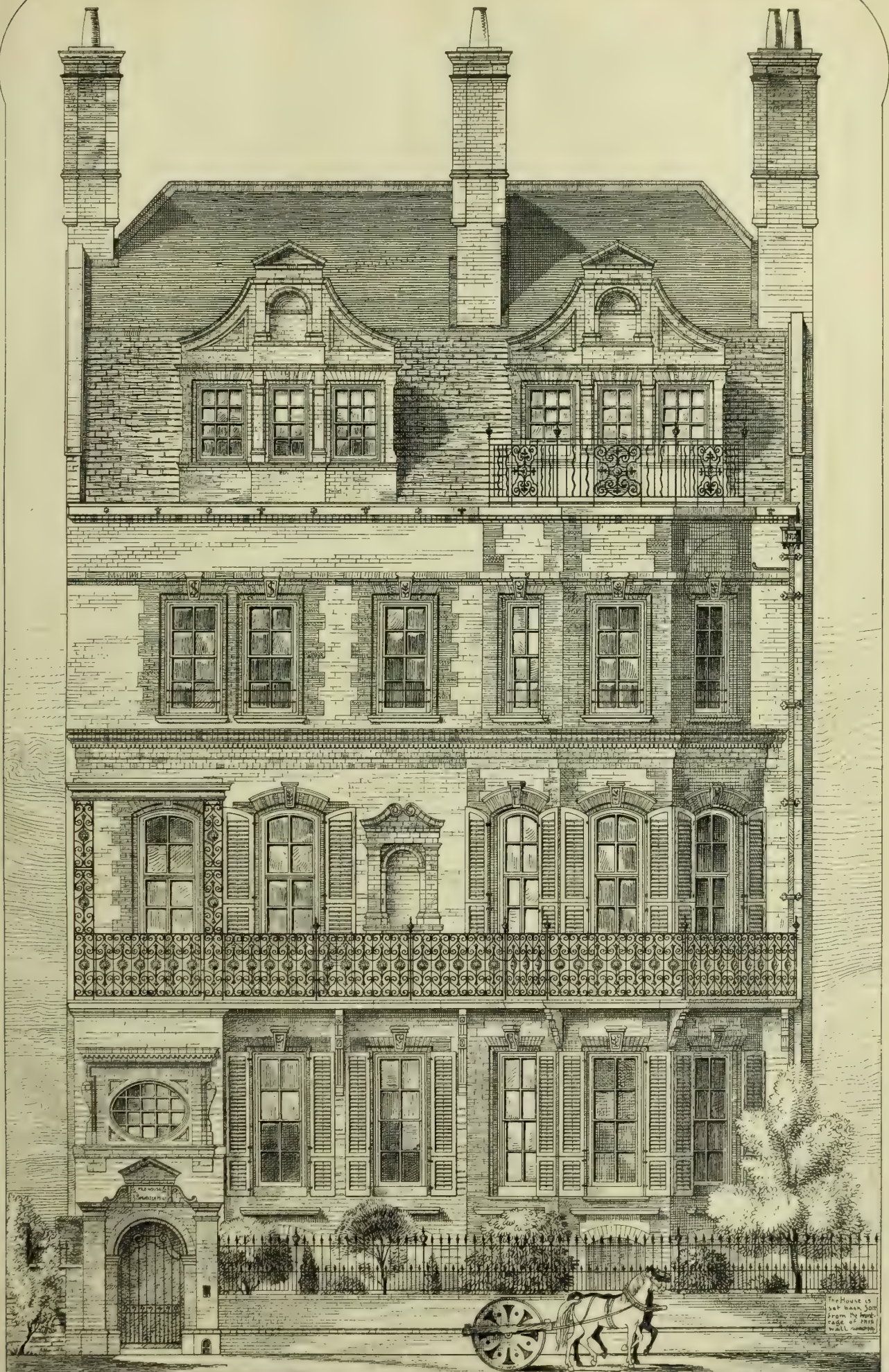
Scale of One Foot to Mouldings


THE : RED : HOUSE :: N<sup>o</sup> 3 :

BAYSWATER : HILL : W :

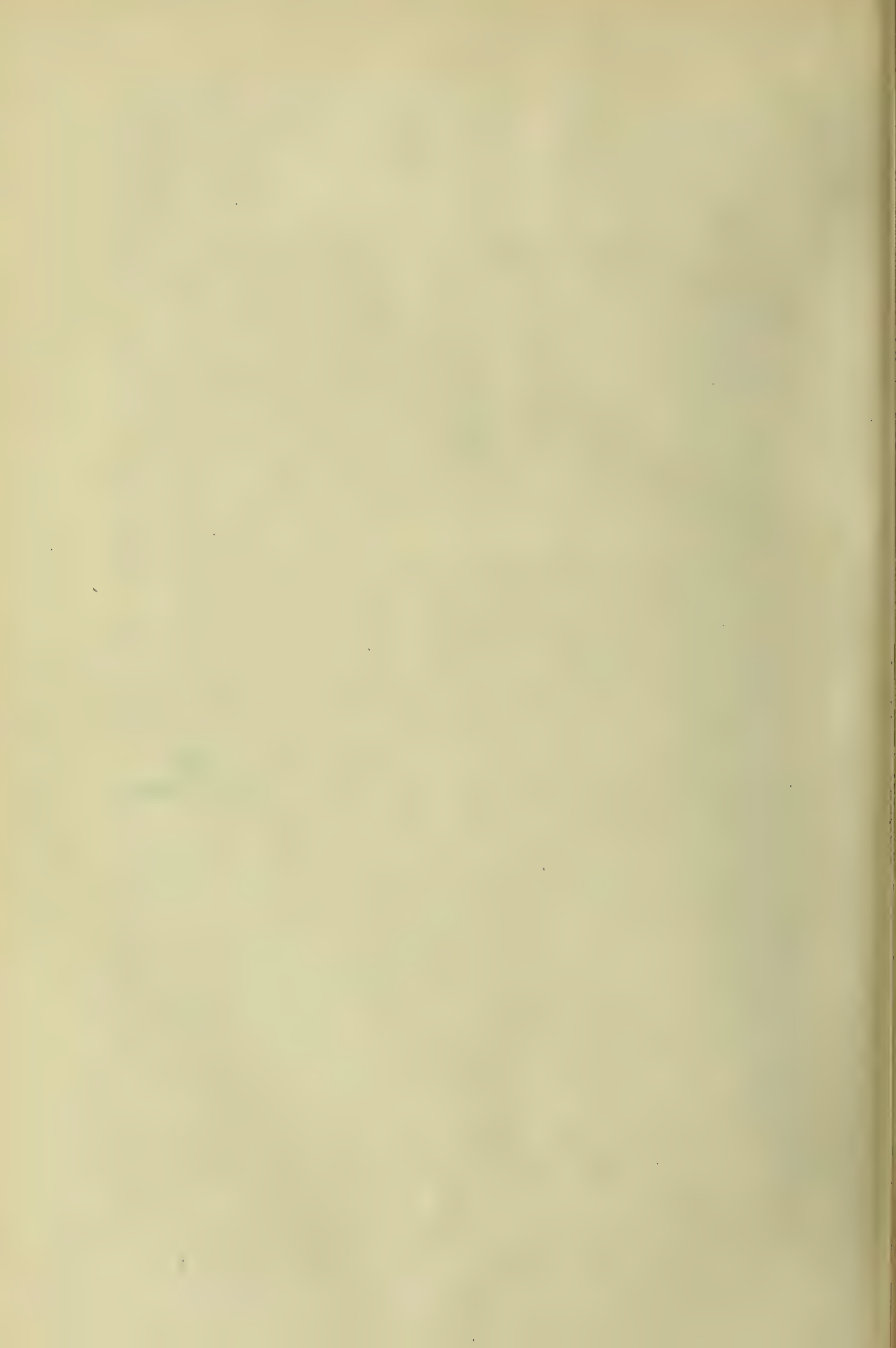
John J . Stevenson Architect :





The Red House No. 3 BAYSWATER HILL  John J. Stevenson Architect



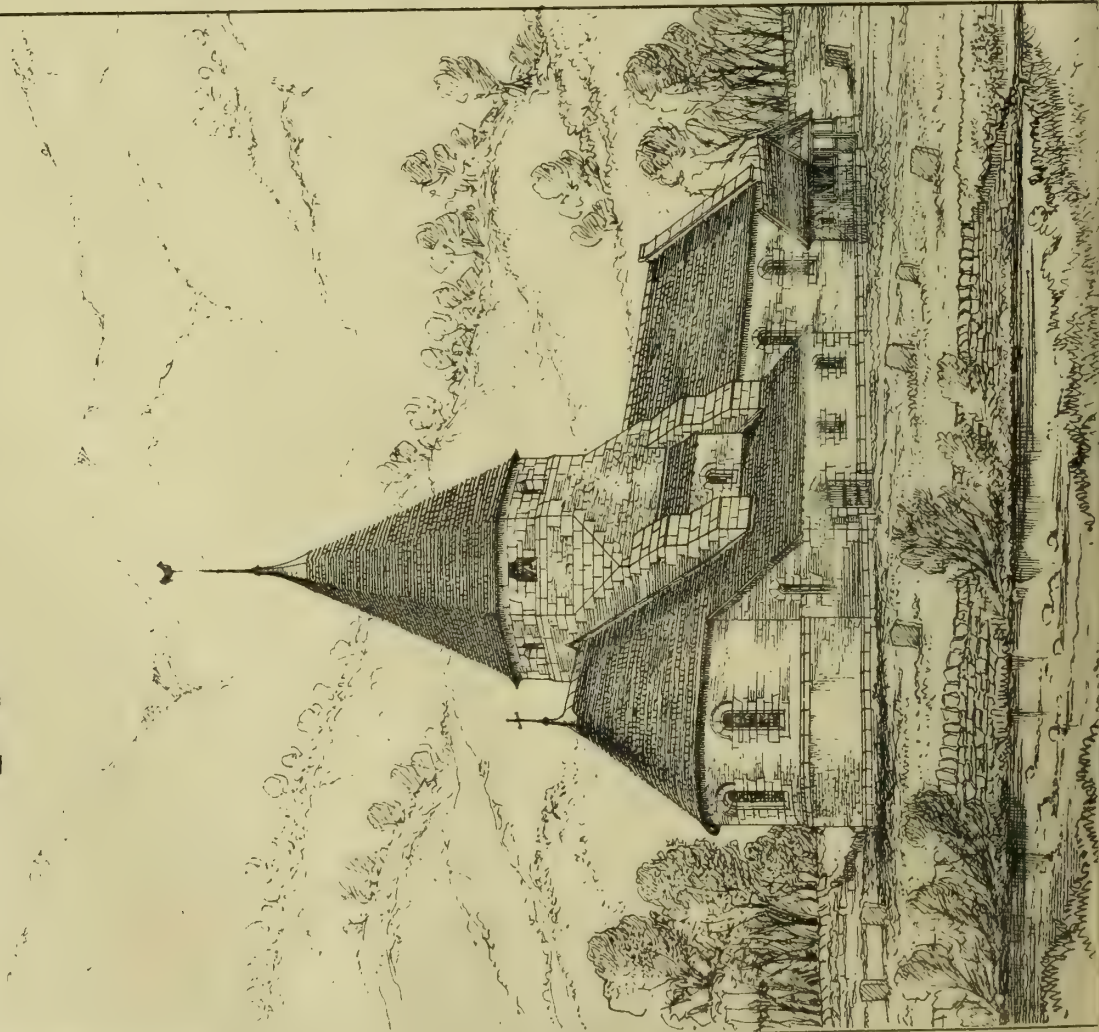
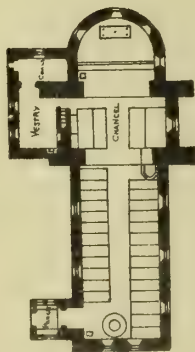




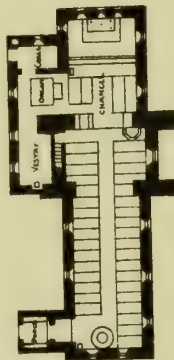




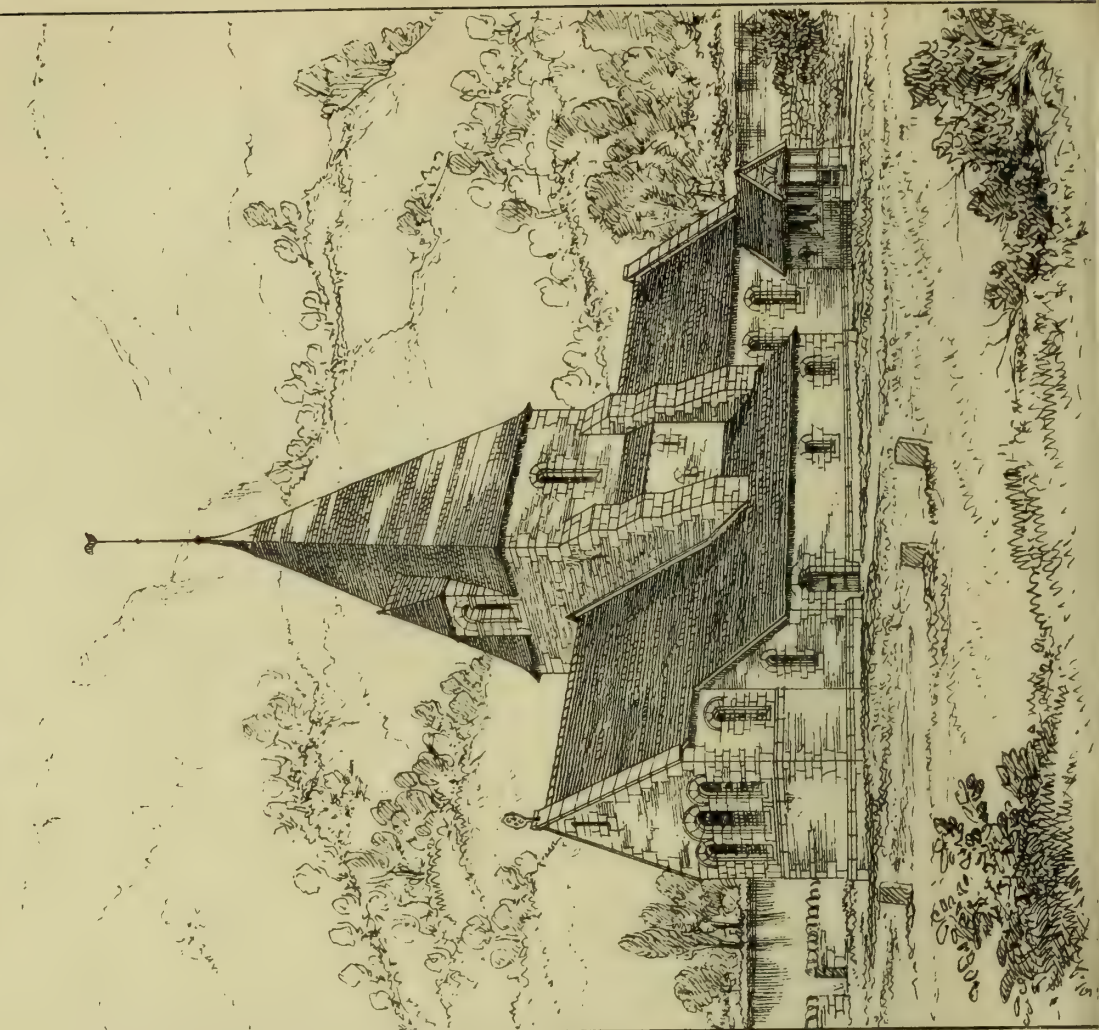
i



ii

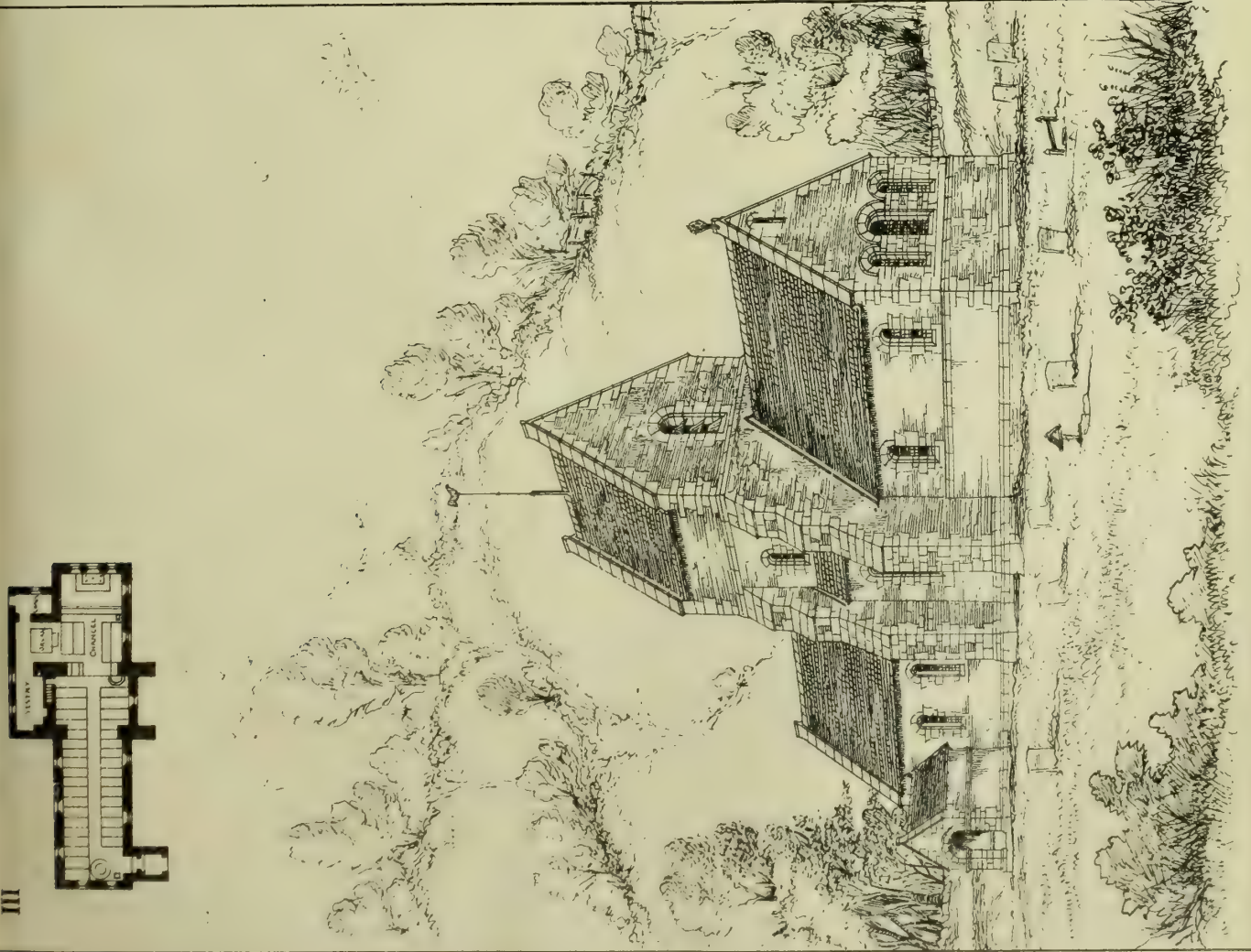
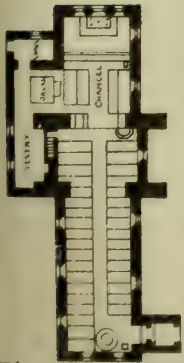


PLAN.



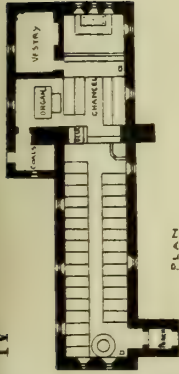


iii



Hubert J. Austin, archt.

iv



N. & P.

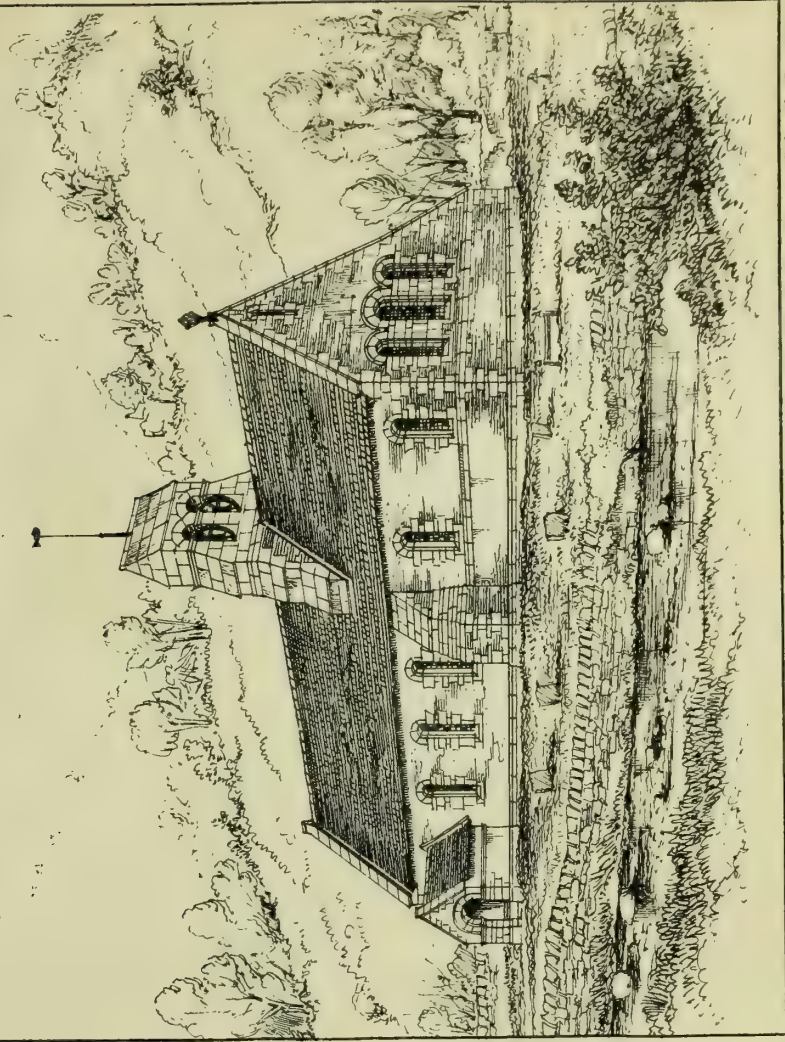


Photo lithographed & Printed by James Akerman St. Grays Inn Road W.C.

PRIZE DESIGNS FOR MOUNTAIN CHURCHES : PALEY AND AUSTIN ARCHITECTS.

FOR THE CARLSB. DIOCESAN CHURCH EXTENSION SOCIETY.







## EMBANKING RIVERS.

IT has been a question of considerable moment to determine how far the partial embankment of rivers improves them, as, for example, our own metropolitan river, the Thames. While the immediate advantages gained by embankment are great—as, for instance, the embankments which have been formed from Blackfriars Bridge, with a short interruption, to Chelsea Suspension Bridge, adding materially to the beauty and cleanliness of our noble river, as well as the reclamation of valuable land along its shores—there are counter disadvantages which though not immediate, follow, and bear out the old adage that “Out of good comes evil.” Now, lateral obstructions, as embankments, jetties, &c., are well known to be attended with certain phenomena. We know the effect of groynes is to form shoals or banks. The same effects are produced by partial embankments. They act as obstructions in diverting the flow and current of a tidal river; in digging or scooping out, by the scour which is created wherever an obstruction exists, a large portion of the bed of river, and depositing the materials a little further along the stream as a shoal. The action is in this way: suppose the tide to be running out, and an impediment of some kind obstructs the natural current, What is the result? An artificial head of water is formed against the impeding object—the water in fact rises in front of it, as any one may see on watching the current of the tide against any obstacle, as the pier of a bridge, when the river is flowing out; and this head of piled water produces a more powerful force on the side of the obstruction, the consequence being the scooping out or a gradual excavation of the river bed near the impediment, and the formation of a pool of great depth in the course of time. The debris thus scoured or washed up settles further on, just in that part where the current or flow is not much felt, lower down the river, just on the other side of the impediment, or where a turn or slight obstruction may exist. The effect of this action may be seen near any stranded vessel in a river, or where tidal action is felt; on one side we get a pool, and on the other a shoal. It is also noticed between Westminster and Waterloo Bridges, and indeed at various points along the Thames where the dredging action of the tide has been induced by any obstruction in the banks.

Now it is pretty certain this scouring or dredging tendency is considerably augmented by contracting the water-way of a river, as the Thames Embankment does at certain parts, and as is the case with the improvements effected some years ago to the Clyde, the bed of which river was found considerably deepened, and the piers of a bridge dangerously affected thereby. We find the subject has been alluded to by one or two writers lately, and the question of the piers of Westminster and other bridges is one that should be set at rest by the construction of proper cutwaters to break the increased scour of the river, and to protect the foundations of our fine bridges from the destructive action of the tide. We would suggest that heavy boulders, if not a more permanent guard, should be placed round the bridge piers, not however contracting the water-way to any great extent.

## ST. GEORGE'S HOSPITAL.

FOUNDED (says the *Times*) in 1733, and rebuilt just one hundred years afterwards, St. George's Hospital was so far unfortunate in that it rose into being at a time when the necessity for what are now recognised, we may say, as first principles of health—pure air and pure water—was, if understood, not, we fear, altogether insisted on. We profit, or at least it is open to us to profit, by the misfortunes of our neighbours, and younger institutions have no doubt reaped the benefit of the experience which has been gained in the last 40 years by the authorities of St. George's, and which the labours of the past three months have striven, and so effectually striven, to realise. The works for drainage and

ventilation, originally constructed, as was but too often the case in those days, on a radically defective principle, had come at last to that state when repairs are useless, and this seriously affected not only the preservation of the building itself, nor even the comfort, but the actual health and well-being of the patients. It had always been a work of difficulty to keep in order the drains, which, running as they did through the very centre of the basement, could never be inspected or repaired without an almost total subversion of the interior economy of the building; and being, as they were, the old brick drains of our grandfathers, it may well be imagined how often such a subversion was found necessary. Now the drains, the pipes of a superior civilisation, are laid outside, and all noxious exhalations and foul gases that may arise therefrom, instead of, as formerly, wandering at will about the wards and corridors, are discharged, through tubes leading up the outer walls to the roofs, harmlessly into the upper air. Where the formation of the building has made such an arrangement possible, all sinks and closets have, after the good example of the sister building of St. Thomas's, been relegated to lobbies, kept sweet by a thorough ventilation from side to side; and not only have the lavatories and bathing arrangements for the patients been enlarged and perfected, but bath-rooms have been added to the nurses' wards. Within, the wards themselves present a very different appearance from what they did three months ago. The veriest tyro in the art of healing will understand the importance of presenting to the eye of the sick man as bright a picture as may be possible of his, perhaps, too cheerless existence. It is more than a comfort—it is a necessity. The body is quick to follow the lead of the mind, and where the latter becomes dull and stagnant the former will soon be found weak and languid. It will be in the experience of most, if not all, of our readers what is the effect in a sick-room of light and colour, only a handful of fresh flowers, a pretty picture, a cheerful pattern on the walls, a glimpse through the open windows of blue skies and waving trees. Such things, indeed, are not to be expected within the walls of a hospital situated in the heart of a mighty city, but even there much can be done. Formerly the walls of these wards were of a dull, cold, uniform colour, which the brightest of summer suns was powerless to lighten, and which, on those sunless days whereof our year has its full share, must have been inexpressibly sad and sombre. They are bright and cheery enough now, and, half in rich buff and half in a soft but not cold gray, can afford to laugh at the gloom of those winter days which are not far off now. In many wards the flooring has been almost entirely relaid, and in one, following the fashion of the new wing, built some six years back, the old lath and plaster have been removed from the walls, and the brickwork coated over with Parian cement, coloured from wainscot to ceiling in the warm buff tones we have mentioned. This, it should be said, is only an experiment, but it is an experiment likely to result in an increase of cleanliness and durability. In every ward, too, the excellent apparatus has been introduced communicating with the outer entrance, whereby the porter is enabled to telegraph at once the approach of each physician or surgeon to his particular ward, thus insuring preparation for his visit, and the presence of the necessary attendants, as well as effecting a considerable economy of time. Nor has thought been taken only for the patients. Many and great alterations have been made whereby the comfort of the attendants will be much increased. A new system has been introduced into the kitchen, and where in former days stood an old-fashioned open range, throwing out so intolerable a heat that any work within its neighbourhood was well-nigh impossible, are now steam closets and roasting-ovens, harming no one, doing their work better and more quietly, and saving an infinity of time, trouble, and, what nowadays is better than either, of coal. A room has been added for the use of the servants after the work of the day is over, and the steward has now a fair-sized room to call his own, instead of the little pantry to which he was formerly confined. Without, in the boiler-house, too, there are great changes. Two large boilers, with all the newest improvements, either of which can do all that is necessary, have taken the place of the two small ones which were together, in full work, but barely able to satisfy the requirements of the building. Lastly is to be mentioned the new and very excellent arrangement of the deadhouse,

which will commend itself at once to all. When a patient died in the Hospital his coffin was placed, one, it might be, among many, on a range of open shelves, and thus those who came to look their last on friend or relative, however near and dear, were perforce obliged to stare about among these gloomy images of death till they found the object of their search. Now each coffin stands on rollers, within its own locker, from which it can easily be drawn at will, without violation either to the feeling of the living or the sanctity of the dead.

## LABOURING CLASSES' DWELLING HOUSES.

THE Public Works Loan Commissioners have issued a statement of the loans they have granted under the provisions of “The Labouring Classes' Dwellings Act, 1866.” The total amount granted is £165,350, and the amount refused, from various causes, £35,200. The grants stand as follows: the great bulk being to be repaid in 40 years, by equal payments, to include principal and interest at the rate of 4 per cent:—

	£
Metropolitan Association for Improving the Dwellings of the Industrious Classes	41,000
Improved Industrial Dwellings Company	84,000
Cardiff Workman's Cottage Company	10,500
Highgate Dwellings Improvement Company (Limited)	2,500
Newcastle-on-Tyne Industrial Dwellings Company (Limited)	1,700
Corporation of Liverpool	13,000
Briton Ferry Cottage Company	1,225
Ino Wood, West Hartlepool	1,750
Adam Spencer ditto	1,750
Mary E. Jenkins ditto	750
Thos. Harland ditto	1,175
Liverpool Labourers' Dwelling Company	6,000
	£165,350

The private applicants are for 20 years.

## THE NEWBURY DISTRICT FIELD CLUB.

THE second excursion this season of the members of the Newbury District Field Club took place on Tuesday week. Leaving Newbury at 9.25 a.m., Caversham Chalk pit was first visited, and next, Grey Friars' Church, Reading, where Mr. F. W. Albury read a paper on the building, which was restored some time back under the superintendence of Mr. Woodman. The party next repaired to St. Mary's Church. The Rev. J. M. Guilding read an extract from a very old Churchwardens' Book, which stated that the old church was the first building erected for religious worship in the town, and it was then called “The Minster,” and gave its name to the street adjoining. In the reign of Edward VI., 1547, £124. 3s. 5d. was paid for rebuilding the church, and a great portion of the materials was brought from Reading Abbey, which had been ordered to be demolished. The wages of a common labourer were 6d. per day, carpenters, 1s., and sawyers, 1s. 6d. per day. Wheat was from 2s. to 2s. 6d. per bushel. In 1594, when the tower was blown down, Mr. John Kendrick gave £50 towards a new tower. Mr. C. F. Oliver, of Minster-street, exhibited an old Roman earthenware pitcher, which was found about 7ft. below the surface of the ground on an adjacent site. The pitcher is very narrow, and 1ft. 7½in. deep. It is plain, and in a good state of preservation. The excursionists next proceeded to the vicinity of Bob's Mount, by way of the Katesgrove and Waterloo kilns of Messrs. J. Poulton and Son. The party was received by Mr. William Poulton, who pointed out the principal excavations. At St. Giles's Church, the visitors were received by the Vicar, who produced a plan of the old church, and said that the date of the old structure was unknown, but there were signs that there was once an old Norman structure on a part of the site of the present church. When they cleaned down the tower wall they found part of a Norman arch and a lean-to roof on the west side, which Mr. St. Aubyn thought might be of Norman structure. The whole of the church was thought to be a perfectly modern structure. A lean-to aisle was pulled down some 70 or 80 years ago. Iron pillars occupied the places of the present stone columns, and galleries ran completely round the church. The font stood at the west end, but his prede-



cessor moved it to the south side. The seats radiated out from the centre, and some of them were pentagonal, the church ending where the transept now began. A small chapel existed a little beyond the present screen. The whole of the outside of the church was plastered over, and the plaster had been removed, and the walls found to be very good. It was supposed that the tower was knocked to pieces in the Civil wars. Mann, in his History of Reading, said that the tower was built up in a very rude and rough way. It was now raised 22ft. The floor had been lowered some 18 inches, and they found on the site of the present columns the piers of the old ones. The south wall and the lower part of the tower were the only old portions of the church. There were supposed to have been two altars—one the high altar, and the other the altar of St. John the Evangelist. The party next visited the house at the corner of Minster-street and Broad-street, which was thrown open to inspection by the tenant, Mr. J. W. Hounslow, who conducted his numerous guests to the up-stairs apartments, the ceilings of which are supposed to be nearly three hundred years old. The mouldings are very perfect. St. Laurence's Church was inspected, and afterwards the (Roman) Catholic Chapel of St. James, where Canon Kingrose described the remarkable font known as the "Reading Abbey Stone." The stone was found in the precincts of the Forbury, in 1835. It consists of one square block of oolite limestone, and stands 20in. high. The upper member or abacus forms a square of 27in., the surface of which is flat and unwrought. Each edge of the abacus is 5½in., and a deeply-cut ornamented chain-like pattern of stems and foliage runs continuously along the four sides. There is a circular hole of about 1½in. in diameter, and 4½in. deep, near the centre of each edge. Beneath the abacus, in recess 1½in., is a species of fillet 2in. broad, quite plain and fresh-looking, but bearing no traces of any former ornament. Below this plain fillet the stone presents the appearance at each corner of a square capital of a column. These capitals and the receding parts between have been exquisitely wrought with elaborate wreaths and intertwining knots. Two sides of this portion of the stone still retain the original design in minute detail and surprising preservation. The other two sides have suffered from mutilation. Reading Abbey was last visited, and dinner partaken of in the ruins. Mr. Albury explained the outlines and dimensions of the Abbey, and read an extract from a description of the building prepared by the late Rev. G. Lewin Maine. Papers were subsequently read on the Guildhall, The Holy Brook, and the Water Supply of Reading.

#### AMERICAN TIMBER.

AT the Convention of the American Association for the Advancement of Science, lately held at Hartford, Conn., U.S.A., a paper was read on the Distribution of American Woodlands, by Professor Brewer, in which he stated that the flora of the United States is believed to contain over 800 woody species, and over 300 trees. Of these trees about 250 species are tolerably abundant, about 120 species grow to a tolerably large size, 20 attain a height of 100 feet, 12 a height sometimes of over 200, and a few—perhaps five or six—a height of 300. New England contains 80 or 85 species, of which 50 may reach a height of 50 feet. Maine is the great source of pine and spruce lumber, but as a whole, the hard wood species predominate. According to Professor Brewer, the area of woodland in New England is not perhaps greatly diminishing, but the amount of timber capable of being made into sawed lumber is lessening. The Middle States have about 100 to 105 species of trees, 65 to 67 of which sometimes reach 50 feet in height. Here were originally very heavy forests. There are still large areas heavily timbered, but the timber for all purposes is unquestionably rapidly diminishing, and there is no compensating influence going on for increase.

But in the Middle and New England States various hard woods attain their greatest perfection as to strength and durability; and as a consequence here we find the manufactures that are dependent on those woods. In the South-Eastern region—that is, extending from Virginia to Florida—we have about 130 species. In each case these form the conspicuous elements of the landscape. Seventy-five attain a height of 50 feet or more, and about a dozen species a height

of 100 feet. A belt of pine timber extends the whole length of this region, which is the great source of the hard and yellow pine. The North-Western region, from Ohio to Minnesota, and north of the Ohio River, is represented by about 105 to 110 species, 68 or 70 of which may reach a height of 50 feet. That is the district furnishing at present the largest production of sawed lumber within the United States. Michigan alone furnished in 1870 of the 12,750,000 of M. feet, 2,250,000; Wisconsin furnished over 1,000,000—the two States thus producing more than one-fourth of the whole yield returned in that year.

#### THE CRYSTAL PALACE.

THE Board of Directors of the Crystal Palace have, through their Chairman (Mr. Thomas Hughes), issued an address to the shareholders in reply to the "grave statements of alleged dilapidation and waste in the Palace," recently made by the self-styled "Crystal Palace Restoration Committee," Mr. F. Fuller, Mr. Scott Russell, and others. Commencing with the specific allegations of waste and dilapidations, the address says that "The first four may be taken together as follows: The Egyptian figures gone; the Byzantine Court much defaced; the Nineveh Court gone; the Tropical end reduced to one-fifth of its original size. The fire of 1866 destroyed almost the whole of the Tropical end of the Palace, injuring and defacing all that was not destroyed. The original superficial area of that portion was 108,288ft. of which 39,744ft. have since been restored; the reduction being to one-third, not one-fifth, of the original size, as stated in the circular. The two gigantic Egyptian statues, and the Nineveh Court, which were destroyed, have not been reconstructed. The eastern screen of the Byzantine Court has not been restored; but the tombs, arcade, and cloisters, which were its main features, have been entirely renewed, and the decorations are almost completed. The Aquarium has been added to this end of the building, without charge to the Company, at a cost of £14,000; and will ultimately become the property of the Company. A portion of the north wing has been re-erected." As to the general charges of dilapidations and waste, the Directors point out that they have expended by far the larger part of the sums which they have felt justified in withholding from dividends on works of maintenance. By this outlay the Board have been able to execute the following important works, viz:—To support the whole of the floor of the Palace on brick piers, in place of the wooden uprights and footings originally used, which, with scarcely an exception, had become rotten; to case in iron the main columns of the centre transept, and form brick piers upon concrete foundations to support them; to renew the whole of the flooring in the centre transept, and to rearrange the hot-water pipes; to renew about 200,000 square feet of the roofing, substituting iron, where possible, for the original wooden framework, which had become rotten; to inclose with brick walls, at depths varying from 5ft. to 15ft., nearly the whole of the interior flower-beds, originally supported by timber, which had also become rotten; to thoroughly repair the water-towers and tanks; and to rebuild the north wing (with the exception of the tower). The result of some of these works may be judged by the fact that whereas, before they were commenced, sometimes as many as 200 panes of glass in the roof were destroyed in a gale, the most violent gales have of late passed over the building without the destruction of a single pane in the renewed portions. Besides the above works, the Directors say they have developed the permanent productive resources of the Palace, (1) by building new forcing-houses for the production of plants, in place of the makeshift wooden constructions previously used; (2) by building new workshops; (3) by fitting up the south tower as an engineering school, and purchasing the necessary plant and machinery; (4) by enlarging and reconstructing the concert-room and theatre; (5) by the erection of new buildings for live animals, and the extension of the printing department; and (6) by reproducing in artificial stone the whole of the statues on the upper terrace, and the twenty-four boy fountains below the water temples. The yearly expenditure on the maintenance and repairs of the main building since the fire has been as follows:—In 1867, £4,695; 1868, £5,302; 1869, £6,629; 1870, £5,302; 1871, £9,011; 1872, £8,560; 1873, 9,581. The assertions as to the unsatisfactory condition of the art collections are

said by the Directors to be entirely unfounded. All are in the Palace, with the exception of those destroyed in the fire. Those which were displaced for the erection of the concert-room and opera-theatre will be found in other parts of the building, and considerable additions have been made to the collection. In conclusion, the Directors say that they consider themselves trustees of a public institution of national importance; and that they have always, to the best of their judgment, fulfilled the duties entrusted to them. In doing this they have expended very large sums out of income in structural repairs, necessitated partly by the inevitable decay of a building of so special a character, but chiefly by faults and omissions in the original designs and construction of the building (carried out when Mr. Fuller was Managing Director, and Mr. Scott Russell one of the Directors of the Company).

#### WILTSHIRE ARCHÆOLOGICAL SOCIETY.

THE annual Congress of the Wiltshire Archæological and Natural History Society was held at Devizes on Tuesday week, under the presidency of Mr. Goldney, M.P. The annual report, which was read by the Rev. A. C. Smith, one of the hon. secretaries, congratulated the members upon the fact that the Society had this year attained its majority, having been established twenty-one years ago. The course it had pursued and the work it had effected were reviewed, there being scarcely any branch of historical or antiquarian research which had not been promoted by the Society. The Committee acknowledge their great indebtedness to the Rev. Canon Jackson for his efforts in advancing the success of the Society since its establishment. The present muster-roll contained 341 names. The report was adopted, on the motion of the Right Hon. E. P. Bouverie, who said he felt great interest in the preservation of the ancient monuments with which Wiltshire abounded. He remembered to have seen, while travelling the county of Wilts some forty or forty-five years ago, parties of men engaged in breaking up the noble stones of the Druidical temple at Avebury, for use in the repair of the roads, but, owing partly to the operations of such Societies as this, that spirit had almost entirely passed away. The officers and committee having been reappointed, the President delivered an inaugural address, in which he defined archæology as a "general inquiry of all that men have known and done in every mode of life since the earliest-known epochs of history." A vote of thanks having been given to the President for his address, the Society walked in procession to its new museum, which the President declared duly opened. The collections have been judiciously arranged by Mr. Cunningham. At five o'clock the members and friends dined at the Bear Hotel. Later in the evening a *conversazione* was held at the Townhall, when a paper was read by the Rev. Prebendary Jones on "Potterne." This was followed by a paper by the Rev. A. C. Smith "On the Old Porch House at Potterne," an interesting specimen of the domestic architecture of a by-gone age, and whose antiquity Mr. Smith thought might be safely estimated at between three and four hundred years. The structure, which is said to retain the same general aspect it wore centuries ago, is now in process of restoration. Canon Jackson then read a paper on "Wolfhall and the Seymours," which created much interest and amusement.

On Wednesday, notwithstanding the wet, about forty of the members and visitors went on an excursion, being first driven to Potterne, where the vicar (the Ven. Archdeacon Buchanan) received them, and conducted them over the fine old church (recently restored). From thence the excursionists proceeded to Eastwell, and on to Keevil, where there is an old manor-house, well worth a visit. The visitors then proceeded to the church, which is stated to be in a sadly dilapidated condition. Having returned to Devizes, the company dined at the Bear, and at half-past seven there was another *conversazione* at the Town Hall, when three very interesting papers were read, viz:—(1) "A Plea for the Moles," by the Rev. A. C. Smith; (2) "On Some Curiosities of Parochial Registries," by the Rev. C. Plenderleath; (3) "On the Old House at Spy Park," by Mr. C. H. Talbot. Votes of thanks having been passed to the President, and to the Mayor and Corporation of Devizes, the annual meeting of the Society was then declared complete.



although there was another excursion on Thursday, by way of Bishop's Cunnings, Wans, Hedington, Sandy-lane, and Spye Park.

### THE TIMBER TRADE OF FRANCE AND HUNGARY.

THE amount of foreign goods entered for consumption in France is about £140,000,000, between a fifteenth and a sixteenth less than her exportation. In 1872 she imported common wood from all countries to the amount of £5,328,000, against £7,612,000 in 1869, being a decrease in the former year of 30 per cent. There is no return for 1872 for British articles of wood, not being furniture, but in 1869 the amount was £30,000, of which Bordeaux took £16,800. France, as a country, imported from all parts, of the same description of wood manufactures £154,800 in 1869, against £154,000 in 1872, being a decrease of a quarter per cent. At Bordeaux, which may be taken as a representative of France in respect to the loss of freight caused to the carrying ships which sail in ballast and must, therefore, make one cargo pay the outgoings of two, the tonnage of foreign vessels sailing in ballast averaged about two-fifths of their laden arrivals in the three years 1866-68, and about a third in the years 1869-71. The great quantity of pitwood shipped for the coal-mines of Wales, so much reduced this deficit in 1872, that the proportion was little more than an eighth. The loss falls chiefly on the British flag, from the number of steamers that bring coals from the northern parts of England, where pitwood can be more cheaply imported from Sweden and Norway. It was increased in 1872 by the operation of a differential duty (*droit de pavillon*), now abolished, which acted chiefly against the British flag. A law passed at the beginning of 1872 laid extra duties, varying with the place of shipment, of between 6s. and 16s. a ton on all goods brought by other than ships of the producing country, French ships, or ships belonging to States protected by treaty against this difference. As the laden indirect inward tonnage of France is about one-sixth of the whole importing tonnage, this revival of an antiquated navigation principle, that had been abjured by a law of 1866, would have seriously embarrassed trade, if the bottoms of Sweden and Norway, Germany and the Netherlands, ship-owning countries, had not been left at the command of importers by treaty stipulation, the restriction falling chiefly on the British. The consumers of the products whose cost was enhanced by this measure, have reason to rejoice that it was met in the United States by a retaliation that at once raised a storm in France, and had, no doubt, its influence in the removal of the restriction. In the mean time, some importers at Bordeaux, of staves from Trieste, were caught by the new law, and having paid large amounts of unexpected extra duty on low-value goods, sent out orders to stop the freighting of the excluded flag.

From the Loire we find the following timber and other building materials exported in the years 1871-2.

	EXPORTS.		
	1871	1872	Sent to.
	Tons.	Tons.	
Lime	693	855	Colonies, British.
Slate	1,435	473	" Italy.
Bricks	1,582	2,059	" Brazil.
Sheet Iron	2,842	3,832	British Possessions.
Iron	150	1,816	England.
Metal works	3,436	3,390	England, Italy, &c.

The importations of timber and other building materials during the same years were as follows:

	IMPORTS.		
	1871	1872	
	Tons.	Tons.	
Building wood	21,679	27,694	Sweden, Norway, and Germany.
Furniture wood	130	842	Reunion, Engd.
Dyeing wood	633	2,738	England, Martinique & Guadalupe.

	Tons.	Tons.	
Iron	3,065	2,460	Sweden, Belgium, England,
Cast Iron	6,500	6,331	England.
Tin	203	199	"
Zinc	730	432	Holland, Belgium

The Norwegian and Swedish vessels which bring timber from the Baltic, and the large number of small French craft engaged in the coal trade, monopolise three-fourths of the grain trade, as they take lower freights than would pay English ships to come out for.

With regard to Hungary, it appears that there is a prospect of creating a flourishing timber trade. The forest lands of Hungary, Croatia, and Slavonia are very extensive, and, under a new law, will be much better managed than formerly. Facility of communication with the sea will enable timber to be brought to the Adriatic for shipment, and possibly England may take a portion of the large resources available, of which at present France and Germany alone consume any quantity. There was, indeed, a direct trade between Fiume and Portsmouth and London, in the years 1819, 1820, and 1821, of considerable importance; for at that time the Navy Board had contracted with Messrs. Adamich and Haire to deliver 20,000 loads of Croatian oak, timber, plank, and trenails, and some 80 British vessels were chartered to convey this timber to England. On the completion of the contract, the British Government declined to have any more oak from thence, as the quality did not meet with their entire approval, and at a period of about twenty years ago, several British vessels were laden there with oak staves, &c., for Great Britain, but this direct trade ceased on the opening of the southern line of railroad (*Sudbahn*), which diverted all the traffic to the neighbouring port of Trieste, and the staves for France were also diverted to that port. It seems now probable, and, at any rate, it is hoped, that the opening of the Carlstadt-Fiume Railroad will enable the Hungarian port to regain something more of its former importance, being, as it is, safe and commodious, and well adapted for the trade in large shipping. It is a free port, and its regulations are very favourable to merchants and consumers.

### Civil Engineering.

ALLOA.—An iron girder bridge has been erected at the North British Railway-station, Alloa, spanning the line. The sections of the structure were cast in the foundry of Messrs. Todd & Son, Leith-walk, Edinburgh. The bridge was opened for traffic on Tuesday.

EDINBURGH.—The operations connected with the widening of the North Bridge are in an advanced state. There have been introduced eight single or four double girders, each about 42ft. in length, and built on the box pattern, which run right across the bridge, and form the main support to the galleries which are to be thrown out on each side, and which will, when completed, be occupied by the foot-pavements. On the east side four, and on the west side two, additional girders are sunk in the masonry of the bridge; but these do not extend across the whole width of the roadway. At both ends of the bridge the old parapet has been removed, and the pavement widened about a foot by the laying down of Craigleith slabs, which project to that extent over the original masonry, and are supported by moulded stone corbels. A new cast-iron panelled parapet, with small columns separating the panels, has here been substituted for the old stone wall.

HAMILTON, N. B.—The foundation-stone of the new Barnclough Viaduct, on the Hamilton and Ferniegair Railway, was laid on Tuesday. The viaduct will have four arches—two of 50ft., and two of 30ft span, and the top of the parapet wall will be about 70ft. above the bed of the river. The total cost is estimated at £7,000.

THE DEVON AND CORNWALL RAILWAY.—The completion of the Okehampton and Lydford section of the Devon and Cornwall Railway will shorten the distance between Plymouth and

London by eighteen miles, will reduce the ruling gradient from 1 in 40, which has now to be encountered on the South Devon line, to 1 in 60, and will avoid the perils by sea which now and then attend travellers by the coast line. The construction of the extension from Okehampton to Lydford was commenced three years ago by Mr. Relf. The length of the extension is within a fraction of ten miles, and the works are extremely heavy. The works are so near completion that they were inspected on Friday last by Colonel Hutchinson, the Government Inspector. Starting from Okehampton station, which is on the verge of Dartmoor, and at a high level above the town, the line at once commences to rise on a gradient of 1 in 78. The difficult nature of the works (says the *Exeter Gazette*) is seen immediately after the train starts, as it plunges directly into a deep rock-cutting, spanned near its western end by a handsome granite bridge. On emerging from this cutting a lovely view is gained of the valley of the West Okement, closed at the north-east end by the view of the town, the river running along its centre, and the ancient castle [described by us last week], with its surrounding grove of trees, perched on a bluff cliff above the stream; the parish-church, crowning an adjacent hill, and in the distance verdant heights completing the scene. Skirting the moor, the line continues to rise over embankments and through rock-excavations, till, with scarcely a warning, we come in view of what may be termed the special feature of the railway—the lofty iron viaduct by which the rails are carried across the valley of the West Okement. This structure, which has been christened The Meldon Viaduct, consists of six openings or spans, of 90ft. each. The roadway is carried on wrought iron girders 9ft. in depth, constructed on the Warren principle. At each end of the viaduct the girders are supported on cast-iron cylinders filled with concrete and surrounded by the embankment, so that their duty is merely to withstand a downward pressure, all lateral movement being controlled by the earth or rather rockwork in which they are embedded. The five intermediate piers are composed of wrought-iron columns, securely braced and riveted together, resting on bases of solid granite, to which they are firmly fastened by massive wrought-iron bolts. Each pier is built up with four columns. The extreme height from the bed of the river to the rails is 152ft. The ironwork for the viaduct was supplied by the well-known firm of Lloyds, Foster, & Co., of the Old Park Works, Wednesbury. It weighs 420 tons. Leaving Meldon, through a cutting of very hard rock, and over a deep bank, we speed onward and upwards until the summit cutting is reached, and the back-bone of Devon is cracked. The summit cutting is nearly three-quarters of a mile long, its depth is over 50ft., and there has been removed from it 167,000 cubic yards of excavated rock. At this point the rails are nearly 1,000ft. above the level of the sea. The summit being gained the brakes are called into requisition, for the line now falls on a gradient of 1 in 78. The old church of Sourton, dedicated to St. Thomas-a-Becket, is passed on the right so close that one can almost see through the windows, and through more rock excavations, and under and over more granite bridges, we hurry until, on emerging from a particularly hard cutting (the very thought of which causes Mr. Relf to groan in spirit), Lake Viaduct is approached. This viaduct is built wholly of granite, and consists of nine semi-circular arches of 40ft. span each and 70ft. high. Bending now a little to the west and diverging from the Moor, but still travelling very heavy cuttings and embankments, the railway passes underneath the Tavistock-road, which is crossed by a sharp skew-bridge built at an angle of 44°. At a distance of 6½ miles from Okehampton Bridestowe-station is reached. The village itself, about a mile and a half distant, is not visible from the line. It takes its name from the patron saint of its ancient church, which is dedicated to St. Bridget (St. Bride), and in 1871 contained a population of 762. Leaving Bridestowe we traverse Fernworthy Down; then ride along a bank having a depth of 50ft., and down a perfectly straight run for more than half a mile, still falling towards Lydford but with a gradient of only 1 in 220. Next comes another deep cutting of 86,700 yards' excavation, which is crossed at an angle of 62° by the public road to Lydford, 23ft. above rail-level, and now we arrive at the viaduct over the romantic valley of the river Lyd. The viaduct is of similar materials and design to that of Lake, but has only seven arches. Its height is



90ft. above the bed of the stream. The Lyd Valley and Lydford itself (which runs along the hill ridge across the vale), with its castle-keep and church tower, are pleasantly picturesque. The old stannary town of Lydford was an important place even before the Conquest, and though the population of the village was in 1871 only 201, the parish includes the entire forest of Dartmoor, 53,900 acres. Arrived at the Lyd Viaduct, Lydford Station soon comes in sight, and alighting on the platform—51ft. lower than the level at Okehampton—we find that the station is laid out contiguous to, and parallel with, the present station of the South Devon Company. For the present the South-Western trains will stop at Lydford, and the running powers into Plymouth are not likely to be exercised until station accommodation has been provided at Plymouth—probably a year hence. No less than 700,000 cubic yards of excavation, mostly in rock, have been shifted. The bridges and viaducts, with the exception of the Meldon Viaduct, are nearly all of granite, of bold design. The engineers are Messrs. Galbraith and Church. A novel feature in the formation of the line is the circumstance that, both with regard to works and land, the cost has been below the Parliamentary estimate. To Mr. Henry Drew, surveyor, of Exeter, the task of purchasing the land was intrusted. The line will be opened for public traffic on the 1st of October.

#### ARCHÆOLOGICAL.

**ANCIENT STONE FORT IN INDIANA.**—One of the most remarkable works left by the aboriginal mound builders is seen in Clarke County, Indiana, U.S.A., fourteen miles above the Falls of the Ohio River. It is an ancient stone fort, built upon the terminal point of a high ridge, which is washed on the south side by the Ohio River, and on the north by Fourteen Mile Creek, a broad and deep stream which empties into the Ohio a few miles below. The point of the ridge is pear-shaped, and the fortification includes from eight to ten acres. The highest point at the stem of the pear is 280ft. above the Ohio River, and is here only 10 to 20ft. broad, with the coniferous limestone 2 to 3ft. thick, exposed at the surface, and the Niagara limestone beneath, and reaching down in an almost perpendicular wall to the river. A natural wall of Niagara limestone furnishes complete protection against the approach of an enemy at the upper part of the fort, with the exception of a short gap on the creek side, extending from the upper point southward for about 100 steps. This break in the natural wall is protected by an artificial wall 75ft. in height, made by laying up loose stone, mason fashion, but without mortar. The base for 65ft. in height follows the slope by the hill, and then rises 10ft. vertically. Around the southern terminus of the point there is an artificial stone wall 10ft. high, which connects the two natural walls of Niagara limestone, thus forming a complete barrier to the approach of foes. On the inside of the made wall are numerous mounds of earth, and within the line of these mounds there is a dug ditch 4ft. deep and 20ft. wide, which receives the drainage from the crown of the hill. A trench was dug through one of these mounds, and slabs of stone were set up on edge and leaning in the direction of the slope of the mound. They extended in for 2ft., and were arranged so as to protect the mound from the overflow of the ditch. Some pieces of charcoal, ashes, decomposed bones, and a large diamond-shaped rock, having a slight indentation near the centre of the top surface, and worn quite smooth, were found in it. On top of the ridge there are also a number of mounds, and the ground slopes very gradually from the northern to the southern extremity, the former being 280 and the latter 160ft. above the river.

**ARCHÆOLOGY IN MALTA.**—During the course of excavation for building purposes on the side of the Jesuits' Hill, near the Marsa, at Malta, the workmen lately came upon an ancient rock-cut cemetery, just below the surface of the ground. The general shape of the excavation is that of an irregular parallelogram, divided into two unequally sized chambers, the smaller on the left being separated from the larger by a solid wall of rock, pierced by a doorway and two archways. Entrance is gained on the east side by a narrow flight of some half-dozen steps, leading through a low archway cut in the rock. At the foot of the steps rises a square pillar, which, together with the transverse wall already alluded to, assists in supporting the solid roof. The height of the

two chambers is about 6ft. Several arch-shaped and deep recesses extend from the larger chamber, three on the side facing the entrance and another immediately on the right. The total length of the two chambers, including the last-mentioned recess, which is about 7ft. long, amounts to 34ft. 2in.; the breadth is 18ft. 8in., to which must be added the length of the three other recesses, measuring respectively 10ft. 7in., 11ft. 9in., and 4ft. 1in. In the sides of the smaller chamber three other similar recesses had been marked out and cut to the depth of a few inches, for the purpose of extending the accommodation when required. The whole floor, except a small passage at the entrance of the two chambers, left apparently for the convenience of laying out the bodies, is pitted with rectangular tombs of various sizes, cut in the rock and lying close together. The total number of the graves is about 50. In the walls were numerous niches for lamps. The only relics of interest discovered were two curious-looking, heart-shaped bronze buckles, one of which has since fallen to pieces, and several small earthenware hand-lamps in rather an imperfect state. One of these had on the form of a star, which, it is known, was one of the numerous symbols used by the early Christians on their sepulchral monuments. There was an abundance of coarse broken pottery mixed with the skeletons. To the left, in close proximity to this old necropolis, an isolated rock-tomb was discovered, which was at first believed to have access to it, but, although probably of the same age, is quite distinct. At a little distance to the right are two curious sepulchral excavations containing rock-cut tombs, now used as store-rooms by a boat-builder. The proprietor of the ground, Signor Nicola Sacco, has presented to the Public Library an epitaph which he found about 4ft. under the surface, a little higher up the hill. It is carved on a slab of Malta stone, of a sub-pyramidal form, 2ft. 7in. high, with a base of 14in. Respecting this relic the following note has been received from Dr. Cesare Vassallo, the learned librarian and archæologist:—"It is interesting as belonging to the fifth or sixth century, and is remarkable for the beautiful simplicity of the inscription, which may be read—*Deo Maximo Flavius Titus vivit annos LV. Civis benemerenti fecerunt.*" Over the inscription is carved the figure of a ship, one of the symbols which the Christians used on sepulchral monuments in Rome as late as the fifth century, and still later in the provinces. The name of Flavius was not unknown to those early Christians, and Martyrology mentions Flavius Clement, of the rank of Consul, who suffered martyrdom under Domitian.

**CELTIC STATIONS IN FRANCE.**—In a paper addressed to the French Academy of Sciences, M. Eugène Robert observes that the men who first set their foot in Europe did not know iron, or, at least, were ignorant of the means of extracting it from its ore; but having, most probably, retained in their memory the way in which the Hebrews sharpened flints according to Moses's precepts, they found some compensation in the abundance of silex they met with in the new countries in which they settled. This was chiefly the case in France, where both the cretaceous and lacustral deposits are rich in that kind of stone. Both kinds were well adapted to their purpose, though their hardness was different. The latter sort was better than the other, being less liable to split, and admitting of being cut with greater art; as we see in flint hatchets, seldom split in the middle, and only chipped, in most cases, like those we find on ancient battle-fields. The substance of this kind of silex is striped red and whitish-brown or red, being of the nature of chalcedony; these strata, grooved into each other, offered better elements of resistance than the uniform kind. There were also weapons made of petrified wood, which were very strong, on account of their fibrous quality, as may be seen in those dug up at Vailly, in the department of the Aisne, by M. Robert himself. As for flint pebble, it is certainly very common in alluvial ground, and it might be asked why the Celts did not take advantage of the ready-made hatchets nature offered them in such formations; the reason lies in the inferior quality of the flint, which, having lost its water, had become more brittle, and was therefore much less applicable to the purposes of attack or defence. Still, they were used when no better were to be had. From these circumstances M. Eugène Robert concludes that the Celts, or first inhabitants of France, must have effected their first settlements in those localities where there was abundance of fresh-water flint. Judging from his own ex-

plorations, he thinks this point settled beyond a doubt. The basin of the Seine was probably the first that received any inhabitants.

**PREHISTORIC REMAINS IN THE PACIFIC.**—A Manilla paper announces the discovery of some prehistoric remains, apparently akin to those of Mexico and the United States, on the little islands of Rota and Tinian, which form part of the Ladrone or Mariana Islands. They appear to consist in each case of two series of eight stone pyramids, standing in two rows, at intervals of 12ft., the base being 12ft. square, and the height 36ft. The summit is crowned by a kind of large cup equal in diameter to the diagonal of the base. There seems to be little doubt that they belong to an age anterior to the Spanish conquest, and that they cannot possibly be ascribed to a race at all similar to the vindictive and degraded aborigines of the archipelago. From the present description, these monuments would seem to have much in common with the prehistoric remains found in Mexico and some of the United States.

**THE INTERNATIONAL CONGRESS OF ORIENTALISTS.**—The first International Congress of Orientalists was held last autumn at Paris; the second was opened on Monday at the Royal Institution, Albemarle-street, with an inaugural address by Dr. Samuel Birch, Keeper of the Oriental Antiquities at the British Museum. The Congress to-day is devoted to the Archæological Section. The President is M. E. Grant-Duff, Esq., and the Secretary, Mr. W. R. Cooper. The sitting is at 11 a.m. at the rooms of the Royal Asiatic Society, 22, Albemarle-street.

## Building Intelligence.

#### CHURCHES AND CHAPELS.

**ABERGAVENNY.**—A report of Sir Gilbert Scott's upon the restoration of St. Mary's Church is being circulated throughout the town and locality. At the beginning of this century this church was restored in a style which gave it more the appearance of an amphitheatre than a place of Christian worship. The estimated cost of restoration is thus stated:—Approximate estimate of the cost for the restoration of the nave, north aisle, and north transept, with new arcade, west front, north buttresses, transept gate, and turrets, but exclusive of some external work which may be deferred if thought proper, £3,750; for external works last named, £575; for the addition of a new south aisle to the present nave and aisle, and new arcade, £1,100; for the restoration and opening out of the south transept to the south aisle, and for the restoration of the lower stage of the tower, £500; for the extension westward of the nave and two aisles, £2,300; for the restoration (interior) of the chancel and its aisles, £1,627; for external works (which may be deferred) to chancel and its aisles, £450; for vestry screens (which may be deferred), £300; for complete system of heating by the London Warming and Ventilating Company's stoves, £300; for restoration of upper stage of tower, £250; total, £11,152.

**BIRMINGHAM.**—St. Clement's Church, Nec-hells-green, near Birmingham, recently closed, was reopened on Sunday last. The building was erected thirteen or fourteen years ago, from designs by Mr. J. A. Chatwin, but, owing to the want of funds at that time, the blocks intended for carving were left plain. Mr. Roddis was recently instructed by the vicar to proceed with the work, which is now completed. At the terminals of the chancel-roof principals, life-size busts have been carved of Noah, Moses, Joshua, David, Isaiah, Jeremiah, Ezekiel, and Daniel. In the two large blocks supporting the chancel, archangels have been grouped together, bearing on one side a band with the words, "Holy, Holy, Holy, is the Lord of Hosts," and on the opposite side, "The whole earth is filled with His glory." The twelve pendants to the nave roof timbers have been carved to represent the Apostles, each figure bearing its own emblem.

**BISHOP BURTON.**—A new reredos has just been added to Bishop Burton Church, Yorks., from designs by Messrs. Clayton and Bell, of London. The reredos, which has been executed by Messrs. Powell and Sons, of Whitefriars, is of vitreous material, the whole being wrought together in a mosaic of small pieces with cement.



The new *retables* forms part of the restoration of the church, the cost of which was provided by the late F. Watt, Esq.

**CLAPHAM.**—On Wednesday week the first Wesleyan chapel built in Clapham was opened. It has been erected at a cost (including chapel-keeper's house, organ, &c.) of £12,000, from the designs and under the superintendence of, Mr. James Weir, architect. The principal material used for the facade is Kentish rag, faced with Bath stone. A spire rises at the north-west angle to a height of 130ft. The chapel is 86ft. in length internally, including the chancel, which is separated from the nave by a lofty arch. All the wood-work is of pitch-pine, varnished. A gallery runs round three sides of the interior. The vestries, six in number (including a ladies' retiring-room) occupy a separate block between the chapel and schoolroom, and there are, in addition, two school vestries and an infants' schoolroom.

**FREYSTROP.**—This little church has been recently almost rebuilt upon the old foundations by Messrs. T. and J. Lloyd, of Haverfordwest, with the additions of a vestry at the north-west corner of nave and a bell-cot over the west gable wall. The only ancient features of interest—a hagioscope, a north doorway arch, a couple of square-headed niches in the east wall of chancel, and a twelfth-century font in good preservation—have all been retained and restored. The internal dimensions are as follows:—Nave, 25ft. by 14ft.; transept (north), 12ft. by 13ft. 8in.; and chancel, 19ft. 4in. by 13ft. 6in. The floor rises eastwards about 9in. in the length of the building, which is not an uncommon plan in old Pembrokeshire churches. The whole of the doors, windows, roofs, floors, and internal fittings are new, and no clue to the date of the originals being obtainable, they have been designed by the architect, Mr. E. H. Lingen Barker, according to a simple Early type suitable to the materials and the locality. The roofs are open-timbered, plastered between the rafters; the seats are placed on wooden platforms. Accommodation is now provided for 120 worshippers, and space is left for 20 or 30 chairs additional when wanted.

**NORTH RIDING.**—A chapel just added to the North Riding Lunatic Asylum, Yorkshire, was opened on Tuesday week. The chapel is cruciform in design, and consists of nave, transepts, chancel, and tower. The exterior is faced with Bradford wall stones, and the dressings are of Whitby stone. The style is Early Decorated. The tower is situated on the north side of the west front, and it is surmounted by a spire of Whitby stone 92ft. high. The dimensions of the church are as follows:—Nave, 75ft. long by 28ft. wide, 20ft. high to the wall-plate, and 42ft. to the ridge. The chancel is 20ft. long, 23ft. 6in. wide, 18ft. high to the wall plate, and 38ft. to the ridge. The transepts are each 10ft. long and 15in. wide, and somewhat lower than the chancel. The tower is 11ft. square inside. Mr. Fisher (of the firm of Gould and Fisher), of York, is the architect.

**NEW WORTLEY.**—The memorial-stone of a new Congregational chapel was laid on Monday at Oak-road, New Wortley. The building, which will accommodate 750 persons, at a cost of £4,500, has been designed by Mr. Thos. Ambler, architect, of Leeds. It is in the Decorated Gothic style, faced with pressed bricks and ornamental stone dressings; it is divided into nave, aisles, and transepts, the nave being divided into four bays by cast-iron columns. There are three large classrooms in the basement.

**SOUTHAMPTON.**—The parish-church of St. Mary, Southampton, is to be rebuilt. Shortly before his death, the late Bishop of Winchester requested Mr. G. E. Street to survey the church with a view to its possible improvement. On the 14th July Mr. Street reported that he had never seen a building so ill-calculated for use as a church; that there is no architectural character in the building, which is mean, ugly, and inconvenient in the highest degree, and that the state of the fabric is not good. Mr. Street thinks it would be impossible to render the existing building in any degree worthy of its purpose, and that money spent with such an object in view would be thrown away. The parishioners have determined to rebuild the church.

**TOPSHAM.**—The church of St. Margaret, Topsham, is about to be rebuilt by Mr. Stephens, of Exeter, from designs by Mr. Ashworth, architect, of the same city, at a cost of £5,500. The

new building, of which the old tower will form a part, being restored to its proper position, will be cruciform in design, and in the same style (Early English) as the original structure, and consist of the tower and belfry, chancel, two transepts, and nave. The exterior walls will be of local limestone, with Bath stone copings and dressings, with gabled roofs. The old font—with the figure of the dragon running round it—will be carefully preserved, and replaced in the new building.

#### SCHOOLS.

**GATESHEAD.**—The schools in Prior-street, erected by the Gateshead School Board, were formally opened on Monday, the 7th inst., a public meeting being held for the purpose. The Mayor, Mr. George Charlton, presided. The boys' school consists of one large main schoolroom 56ft. by 34ft., with seats arranged on the "double Battersea" plan, and three classrooms each 20ft. by 18ft. The girls' school, which is on the first floor, approached by a stone staircase in short flights, is almost identical in its arrangement with the boys' school, over which it is placed. The main school is somewhat larger than the boys', being 63ft. 6in. in length, and the classrooms being the same size as those for the boys. The infants are accommodated in two large main schoolrooms, each 56ft. by 34ft., with four classrooms, each 20ft. by 16ft. 6in. The heating is partly by hot-water pipes and coils, and partly by patent ventilating stoves, which will also supply warmed fresh air to the rooms during their use, and when desired cool fresh air in summer. The ventilation will be by means of Sheringham valves for admission of fresh air, and ceiling ventilators, communicating with small roof dormers, for the abstraction of foul air. The upper halves of the windows are also in all cases made to open, being pivot hung. Accommodation is afforded for 373 boys, 405 girls, and 636 infants, giving a total of 1,414 children. The boys and girls' schools are planned to give an area of 8 square feet of floor-space and 128 cubic feet of air to each child; the infants' schools to give 8 square feet and 136 cubic feet to each child. The cost of the buildings, including fittings, book-closets, seats, and desks, boundary walls and railing, and all other work in connection, has amounted to £7,533, or £5. 6s. 4d. per child. Mr. John Harrison, of Gateshead, was the sole contractor; Messrs. Walker and Emley supplied the stoves and heating apparatus; Mr. Edington has acted as clerk of the works; and Mr. Thomas Oliver, of Newcastle, was the architect.

**GRIFFITH'S TOWN, MON.**—These schools, for the Llanvrechva Upper School Board, were publicly opened on the 14th Sept. by a treat to the scholars. The buildings stand upon an elevated site facing the Monmouth Railway and Canal, and can be well seen from either of these places. They are a simple Gothic structure, with but little attempt at ornamentation, but the skyline is broken by the arrangement of roofs, chimney-stacks, &c., which, assuming a purely utilitarian and scholastic character, produce a pleasing effect. The buildings generally are of hard Pennant stone from Glen Forest and Abergavenny, with Bath-stone dressings; the timber-work of hard red pine, all internal work stained and varnished. The schools accommodate 90 boys, 90 girls, and 110 infants, allowing nine superficial feet per child, and, including master's house, boundary-walls, and all necessary offices, cost a fraction over £6 per child, which, considering the difficulty of getting materials on site, is exceedingly low. The contract was taken and has been well carried out by Mr. William Jones, builder, Newport, from designs by, and under the supervision of, Mr. E. A. Lansdowne, architect, Bank Chambers, Newport.

#### BUILDINGS.

**GLASGOW.**—The offices of the Royal Bank have been remodelled and considerably extended, at a cost of from £12,000 to £14,000, from designs by Messrs. Peddie and Kinnear, architects, of Edinburgh. Instead of having a number of separate rooms arranged round the telling-room, it was resolved to throw the whole space, with the exception of a manager's room, boardroom, and waiting-room for the porters, into one large hall, with a length of 90ft. and a width of 80ft. over all. The central portion, measuring 50ft. by 40ft., is carried up to the height of 40ft. and lighted from the roof, and is appropriated as the telling-room. The side spaces, again, have only the height of 20ft., there being here ranges of apartments overhead. Between the central area and

the side spaces are a series of Composite columns combining Ionic and Corinthian pilasters. The former, facing the central hall, support enriched arches filled in with scalloped or fan work, and over these are a cornice and frieze from which springs a cove about 11ft. in height, boldly pannelled and pierced all round with fourteen curved windows each about 9ft. long and 6ft. wide. On this cove rests a flat ceiling richly pannelled in plaster work.

**NEWINGTON BUTTS.**—A new Baptist College for the students in connection with Mr. Spurgeon's Metropolitan Tabernacle was opened last week. The building, which has been erected by Messrs. Hill, Higges, and Hill, from the designs and under the superintendence of Mr. Henry Currey, architect, Norfolk-street, Strand, has cost £14,000. Externally the building is of red brick, pointed. Much ingenuity has been shown by the architect in the planning, the site being in shape that of an acute-angled triangle. On the ground-floor are the college common room, six classrooms, and curator's room; and on the first floor are the hall, library, lecture-room, four classrooms, &c. Seventy-eight students will be boarded and lodged on the establishment, and accommodation is provided for 120 students attending classes and lectures in the evening.

#### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.  
Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

#### ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 9d. per line.  
Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

#### TERMS OF SUBSCRIPTIONS.

(Payable in advance).

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N.B.—American and Belgian subscribers are requested to remit their subscriptions by International P. O. O., and to advise the publisher of the date and amount of their remittance. If the last-mentioned precaution is omitted, some difficulty is very likely to arise in obtaining the amount. Back numbers can only be sent at the rate of 7d. each, the postage charged being 3d. per copy. All foreign subscriptions unaccompanied by an additional remittance to cover the extra cost of forwarding back numbers are commenced from the next number published after the receipt of the subscription.

Cases for binding the half-yearly volumes, 2s. each. Subscribers receiving their copies direct from the office are requested to observe that the last number of the term for which their Subscription is paid, will be forwarded to them in a coloured wrapper, as an intimation that a fresh remittance is necessary, if it be desired to continue the subscription.

RECEIVED.—J. C. C.—T. L. and Co.—J. K.—W. R. W.—D. and E.—S. W.—M. and T.—G.

ALFRED CASDEN.—Yes.  
JOHN PHILIPS, Market-street, Manchester.—The irregularity must be attributable to imperfect agency, as the BUILDING NEWS is regularly published early every Friday morning.

## Correspondence.

#### TABLE OF THE TEN COMMANDMENTS.

(To the Editor of the BUILDING NEWS.)

SIR,—The 82 Canon requires that "the Ten Commandments be set up [Latin Version, 'pingatur'] on the east end of every church and chapel where the people may best see and read the same," a provision which points to the part of the building which they occupy. I have noticed in my recent edition of the Canons (Parker and Co.) that in 1560 they were to be placed "in the east end of the chancel" to mark it as "a place of religion and prayer," and in 1564 were to be "over the Table." In 1604 the nave is meant by the word "church;" as Cosin in 1662 asks whether



there is a convenient seat in the "church or chancel," so the rubric requires the Prayers to be used "in the accustomed place of the church, chapel, or chancel"; and speaks of the "body of the church or in the chancel."—I am, Sir, &c.  
MACKENZIE E. C. WALCOTT.

#### ASPHALTE PAVING.

SIR,—Your correspondent, "Mr. John Lemon, of Beith, Ayrshire" (see p. 331 in last week's BUILDING NEWS) surely cannot have witnessed the manner in which the asphalt laid in the London streets wears out, or he would not have written to you suggesting that the surface of the asphalt should be stamped or impressed so as to render it less slippery both for man and beast. Such a treatment of the surface would obviously prevent slipping, while the impressions remained; but how long would that be? Asphalt is so friable and compressible that a few days' London traffic would entirely obliterate the indentations or "scoring" suggested by your correspondent. Of course, asphalt so treated, though not so noiseless for traffic as when laid with a smooth surface, would be much less noisy than granite cubes; but then the innumerable projecting edges and corners that would exist in an asphalt pavement treated as suggested would be at once worn off by the attrition of the wheels of vehicles and the shoes of the horses. This is seen in the fact that wherever asphalt has been laid down in conjunction with a tramway, the wheels of the ordinary vehicular traffic have "hugged" the tram-rails and speedily ground away the surface of the asphalt until long, deep, and dangerous grooves have been formed alongside the tram-rails. This has been the case especially in the Walworth and New Kent-roads, the asphalt of which is constantly under repair. That asphalt, unless laid with a smooth surface, wears, or is literally ground away, very speedily by the wheels of vehicles is seen in the fact that the asphalt companies are very careful to fill up and make good the slightest indentation or inequality that shows itself, from whatever cause, on the surface, simply because they know that, owing to the soft and friable nature of asphalt, a small hole is speedily worn into a large one. For these reasons, asphalt, if used for vehicular traffic, must be laid with a perfectly smooth surface. Such a smooth surface is decidedly unfit for vehicular traffic, and the sooner asphalt roadways are superseded by wood pavement where quietness is of paramount importance, and by granite cubes or macadam where durability and economy are the main essentials, the better will it be for the safety of man and horse. Asphalt, however, has a great future before it as a paving material for footpaths, yards, courts, basements, &c., its unbroken surface (freedom from joints) rendering it of far greater value, from a sanitary point of view, than York flagging or any other kind of paving stone. Asphalt may also, perhaps, be advantageously laid down in the roadways of such narrow City streets as Ironmonger-lane, where there is little or no traffic, owing to there being room for only one vehicle in the width of the roadway. The asphalt companies will do well to seek to extend the use of their material for the purposes last named, rather than as a paving material for the roadways of streets with a heavy traffic.—I am, Sir, &c.,  
DELTA.

#### CHIPS.

A new riding-school and an infirmary for horses form important additions which are being made to the Cavalry Barracks at Preston, Brighton, for the War Office authorities. Mr. Colwell, a local builder, is the contractor, and the estimated cost is £4,500.

Mr. Lee, architect, of Whitehall-place, has prepared plans for new casual wards for the Hackney Union. The wards, which are designed on what is known as the "cellular" system, will cost about £4,000.

Works to the amount of upwards of £6,000 are proposed to be carried out at Hackney for the separation of the workhouse from the pauper infirmary.

At a meeting of the residents in Holborn and Chancery lane, held at the Inns of Court Hotel on Wednesday, it was determined to take steps for the widening of the Holborn end of Chancery-lane. It was decided that a deputation should wait on the First Commissioner of Works, soliciting his approval and aid.

An Exhibition of Arts and Antiquities was opened at Inverness on Tuesday.

The foundation-stone of a new Congregational Sunday school was laid at Drybrook, on Sunday week. The cost will be £650. Messrs. Eassie and Co., of Gloucester, are the builders.

The Wesleyan Chapel at Kibworth was reopened on Monday week, after restoration at a cost of £150.

George Clark, of Pen-y-Gelli, near Wrexham, trading under the style of Clark and Parker, has gone into liquidation.

Mr. S. L. Slade, one of the victims in the lamentable collision at Thorpe, was a member of the firm of Ackerman and Slade, architects and surveyors, of Regent-street, and had been staying at Yarmouth for a holiday.

## Intercommunication.

### QUESTIONS.

[3458.]-Belgium.—I hope to go with a few of my assistants shortly for a hasty ramble amongst some of the old towns of Belgium. Personally, I know the general run pretty well, but should be obliged for a hint or two as to the names of any out-of-the-way places where really good ornamental detail in wood or stone, ancient or modern, may be found.—HARRY HEMS, Carver, Exeter.

[3459.]-Strength of Iron Shoe.—I have a joist bearing on a cast-iron shoe of the following size and description: The flange  $\frac{1}{2}$  in. thick at bottom, which receives end of joist, projects from wall  $\frac{3}{4}$  in., and is  $\frac{1}{2}$  in. out-to-out of the pocket-pieces, which latter are  $\frac{1}{2}$  in. thick, and are curved back to the iron box, which is let flush into wall. This is  $\frac{1}{2}$  in. high, so that the strain will be entirely upon these side or pocket-pieces of  $\frac{3}{4}$  in. projection and  $\frac{1}{2}$  in. high. Will one of your readers inform me what is the safe load for such a shoe, and the mode of calculating same.—H. M. H., Manchester.

[3460.]-The Pointed Arch.—In "A Series of 24 Views selected from Sir Robert Ainslie's collection of Drawings in Palestine, Egypt, Syria, Corinth, and Ephesus, 1833," there is a view of Joseph's Hall, in which is shown pointed arches springing from Corinthian columns. If these are correctly drawn, the construction of the pointed arch must have been known earlier than it is generally thought; it is also before the Corinthian column was known, as it must have been about 1700 years B.C. I should be glad if anyone will kindly explain this to me.—IGNORAMUS.

[3461.]-Eagle Lectern.—How did the custom originate of reading the Lessons in church from an eagle with expanded wings? Has it any symbolical meaning?—H. R.

[3462.]-Party Walls.—I want to make an opening in a party wall dividing two buildings, which, taken together, contain less than 216,000 cubic feet. Am I permitted to make any opening at all in such a wall, and if so, am I at liberty to construct same as I please? Clause 3 of Sect. 28 of the Building Act provides for the construction of openings in party walls dividing buildings, which, taken together, contain more than 216,000 cubic feet, but says nothing in respect of buildings containing less than that number.—PERPLEXED.

[3463.]-Notices to District Surveyors.—In the event of a builder failing to give notice of intending works, &c., to the district surveyor, and thereby subjecting himself to the £20 penalty, is the employer liable in any way for the omission?—PERPLEXED.

[3464.]-Gothic Fittings.—Could any of your readers inform me of a book on Gothic fittings to houses, &c., as doors, windows, staircases, &c., and whether there are any original Gothic staircases in existence, as I have never come across one.—C.

[3465.]-Rats and D mp.—A patron of mine has a breakfast-room, situated in the back part of his house, which is infested with rats. For some time the smell rising from the floor has been so offensive that the room is comparatively useless. We opened the floor to try to banish the rats, but found the joists quite rotten. The ground at this part of the house rises so much that a current of air cannot be introduced underneath; hence the failure of the joists. I have been thinking of recommending the removal of the joists and boarding and putting down an asphalt floor, as a remedy against both the rats and the damp; but not having experience of its suitability in a room to be carpeted, I shall be greatly obliged if you, or some of your correspondents, will kindly advise me.—J. M. D.

[3466.]-To render Fir Timber Fireproof.—Will any reader kindly inform me what method can be adopted to render a beam fireproof?—T. W. B.

### REPLIES.

[3435.]-Strength of Tee Iron.—I am obliged to "G. H. G." for his reply to my question, but should like to know why the flange does not enter into his formula, and also how the value 4 of the constant "C" is arrived at?—G. P.

[3437.]-Railway Curves.—It would be evidently wrong not to consider the ordinary required speed of a train in determining a radius of the curve; for if the curve was fixed upon, the cant would have to be in excess or equal to the maximum amount of speed, and with a radius of, say, five chains, with a speed of thirty miles per hour, the cant would be too excessive in practice. A cant of 10 in., for example, would be too much, though that amount would be required for a train travelling at the rate of sixty miles an hour along a curve of ten chains radius (narrow gauge). For a speed of say sixty miles per hour a radius of not less than twelve or fifteen chains is necessary, if a fair amount of cant is required. Having approximately determined the radius, the cant may be found as follows:— $W \frac{V^2}{125 R}$  = elevation of outer rail in

I explained for a certain wheel base. The formula I gave was to find the radius of a circular arc to touch three straight lines or points, these determined by the length of carriage.—ENGINEER.

[3438.]-Lattice Girders.—In reply to "G. P.," the rule as given by "Geometrician" was for a fixed load, not a moving one. If "G. P." wants a moving load advancing from either end, in addition to the rule already given, it is only necessary to erect a vertical at the point of support, and lay off the strain on end lattices from the moving load evenly distributed, and join its extremity to the opposite support by a parabolic curve. The ordinates so obtained, added to the ordinates for the fixed load, will represent the maximum strain at any point from both loads; or the ordinates from the horizontal line to the parabola will give the strain due to moving load alone. I think this explanation will be all "G. P." wants, and if he refers to some recent pages of the BUILDING NEWS I think he will find an example worked out. The formula I gave was for a distributed load, and gives strains at the centre of top and bottom flanges, or  $\frac{WL}{8D}$  = strain

at centre: for any other point the formula is  $\frac{W}{2DL} (Lx - x^2)$  = strain at any point whose distance is  $x$  from support. The strain on any lattice is given by formula  $S = W \frac{al}{DL}$ ; this is for single triangulation;

$a$  being distance of centre of any lattice from centre of girder; and  $l$ , length of any lattice.—ARCHITECT.

[3445.]-Moment of Rupture.—"Architect's" reply to this question contains an error of vital importance. He does not seem to be aware of the difference that exists between the "moment of rupture" and "strain," as he gives the same formulæ as expressing both, which is incorrect. The strain on a beam is obtained by dividing the moment of rupture by the depth of the girder. All the formulæ given by "Architect," on p. 330 give moments of rupture, and not strain, as stated by him. For example, he says, speaking of a girder supported at both ends: "When the strain (I suppose he means load) is equally distributed, instead of straight lines, draw a parabola and make its vertical centre ordinate =  $\frac{WL^2}{8}$  and any other

ordinate will equal strain at that point." It should be, "will equal moment of rupture at that point."—G. P.

[3447.]-Contracts.—It is quite sufficient if the architect witnesses the signature. The architect or his clerk is the usual witness, except when the contract is drawn by a solicitor, in which case the solicitor or his clerk is the witness.—L.

[3447.]-Contracts.—It is evident that as the architect is one of the principal agents referred to in the building contract, inasmuch as he, by its presents, is given an all but absolute power over the contractor, his decision in all matters being made binding, he becomes the party who has to order, and the contractor to obey; and ought, by his sense of equity and fairness, to leave it to others to execute a document of such a binding nature. An architect being his own witness to a deed giving to himself, by its provisions, such control over the actions of another, by virtue of which he becomes an interested party, places himself in a very invidious position in so doing, and instead of strengthening, weakens the weight which, under other circumstances, might attach to the signature of an impartial witness.—LEX.

[3449.]-Rain-water Tanks.—In providing for the removal of rainwater from roofs it is usual to consider the depth over the whole area of the roof at half an inch per hour. This question is worded rather vaguely.—G. P.

[3449.]-Rain-water Tanks.—If "Aqua" wants to know of what capacity rain-water tanks should be in proportion to roof area, I would say that the best size would be half a cubic foot of tank room for each superficial foot of roof area. This is estimated upon the basis of what is found in practice to be the proper capacity for storage reservoirs, say from 20,000 to 30,000 cubic feet per acre of gathering ground.—JOHN WALKER.

[3450.]-Architectural.—1. When a quantity surveyor has performed his work, and the intention to build be given up, he is not thereby disentitled to payment, but may abate somewhat because his responsibility is at an end. 2. A builder should do what he is paid to perform. A surveyor discovering a defect in the drawings or specification should consult the architect. If he make a bill for more expensive work than is described without acquainting the architect, and the builder does the inferior sort only, the employer is wronged, and the surveyor liable for the loss. Collusion would make a serious case. 3. The prices in the schedule are *pro rata*, and intended to regulate extras and omissions. They should be sent under cover. 4. Formality is not essential, provided the intentions, obligations, and powers of the parties be represented by signed documents, but the stipulatory part should be kept distinct, and in large affairs arranged by a solicitor. 5. When a competitive design embraces two objects, and the successful architect is employed upon one only, while the other is relinquished or indefinitely postponed, he should be paid in full for the first and compensated for the other, as provided for in the rules of the Institute. Dry-rot would entail responsibility under very flagrant circumstances only. Where the architect is responsible the builder must do as directed. If a builder introduce improper materials, he is open



to the full consequences, but if such materials continue long exposed to observation, and the architect, though present from time to time, makes no objection until the removal causes much labour, besides injury to other work, the builder's original fault is not removed, but the architect is implicated. The contract is between the employer and the builder, and should be faithfully observed. An architect's relation to his client is like that of an advocate; he is less the representative of his powers than of his interests. It is his duty to protect and further these, but he must not compromise or prejudice them without special consent. Dishonesty is not presupposed in any of the parties, nor justified in the surveyor or builder, though undetected by the architect.—REGULATOR.

[3450].—Architectural.—1. Yes. 2. No: If the surveyor has taken a more expensive kind of work than that described in the specification, &c., the "architect" has no remedy against the surveyor. 3. It is not the general practice to have the priced schedule left with the architect; but when by the terms of the tendering it is stipulated to be so left, it is usually, for obvious reasons, moneyed out; as to whether the schedule is to be open or sealed, is quite a matter of mutual arrangement, and is usually stated in the conditions of contract or invitation to tender. 4. If the builder tenders in some such form as this: "I am willing to perform the works," &c., "according to plans," &c., it is quite safe to have his tender stamped and to write a letter accepting it. If, on the other hand, the tender states that the builder is "willing to enter into a contract to perform the works," &c., it is desirable to have a formally-drawn contract. In either case the law will enforce specific performance of what the builder has offered if his offer has been duly accepted—i.e., in the first case it will compel him to carry out the work, and in the second to enter into the contract or pay the damage caused by his refusal or neglect. Where plans, specifications, and other documents are referred to in a contract and not drawn thereon or recited at full length therein, it is advisable to be able to prove their identity in case of dispute. The best method is, of course, to have the signatures of all parties to the contract to a short statement written thereon, to the effect that this is the document or plan or specification referred to in the contract, but no special form of words is necessary; and in proving the documents in evidence, probably, in ninety-nine cases out of a hundred, the evidence of the architect on oath, with, if necessary, that of the proprietor, the architect's clerks, the quantity surveyor, or, in fact, any one who could depose as to the identity of the documents, would be sufficient. 5. Depends entirely upon the terms of the competition; but as the greater number of competition conditions are extremely unfair and one-sided, the answer would probably be, No. As to the position of the executors in the matter, refer to the books mentioned below. 6. An architect can be held responsible for any loss or damage which can be proved to the satisfaction of the jury to be the result of a want of ordinary and usual care in the execution of his duty. The results of actions differ, much as men's opinions differ on many other subjects; but the rule of the law is that every one is bound to use usual and ordinary care in carrying on his work. As to what is usual and ordinary, is matter for evidence, and is for the jury to determine. A builder cannot enforce a claim for extension of time which may be necessary to enable him to replace with proper materials those which are not in accordance with his contract. The builder has no right to refuse the removal of any material at any stage of the work which is not in accordance with the contract, except on the ground that he received the express sanction or direction of the architect to use it. Ask your questions a little more clearly, and when you number them do not include three or four distinct queries, requiring separate answers, under one number. Read "Contracts for Works and Services," Weale's elementary series; and "On Building Contracts," by E. Jenkins, Esq., and J. Raymond, Esq., Barristers-at-Law. Publishers, King and Co., Paternoster-row.—L.

[3450].—Architectural.—1. In the absence of an agreement to the contrary, a quantity surveyor is not entitled to his full charge if the works are not carried out, as there would be no responsibility incurred by him: If the quantities are set aside by alterations made by the employer or architect, the case is somewhat different, and it may be a question whether the surveyor could not claim his commission if the altered work was carried out. It is always best to stipulate in such doubtful cases. 2. If the bill of quantities is not recognised or referred to in the agreement, the architect cannot require the contractor to execute any item included in it that does not appear also in the plans or specification. As regards the second part of this question, the architect has no remedy against builder unless the specification refers to the quantities; besides, it would be manifestly unfair to call upon the builder to do more expensive work, when the architect would not allow for any deficiency in the quantities were such discovered. 3. In the generality of cases the rated schedule of prices is only required, and is sufficient; as to the second part of question, it is immaterial, though schedules are generally left open with the architect. 4. It is not legal nor sufficient to get the contractors simply to sign a clause on plans and specification referring to tender, though it is often done in small works. 5. This question depends upon the terms of the advertisement. We think you can claim to be employed on the library when it is carried out, or for commission upon it if abandoned by the committee; and we should say an architect's executors could continue his claim. 6. We consider if dry-

rot appears in a building within a reasonable time of its completion, the architect is responsible if it can be shown that: through want of precaution in design or plan, as ventilation, the timbers are exposed to such disease; but if no want of foresight in design or construction can be laid to the architect, the builder is certainly responsible for defective materials and workmanship. The architect is responsible only for error of judgment in design, as in wrong modes of construction, insufficient scantlings, and the like, which form part of the plans and specifications. We believe this is the fair division of responsibility, and has been so held. If inferior material has been inserted in a building that has escaped the notice of the architect, he can certainly order its removal; though the exercise of this power is a nice question sometimes, as when the negligence or oversight of the architect can be pleaded. If such negligence exists, the architect has no power fairly or legally. In the latter case the builder certainly can plead delay and an extension of time.—AN ARCHITECT.

[3451].—Windows.—There is no "great principle of law which interferes with an owner putting windows in the side of his house set back 2ft. from the party wall, and overlooking the garden and house of an adjoining proprietor;" but observe also that there is "no great principle of law" which will prevent the adjoining owner placing, within 20 years, upon his own land any obstruction to the said windows.—L.

[3452].—Boundary Walls.—Adjoining owner cannot substantiate any claim to the ownership of the land on his neighbour's side in the case quoted, but he may, by the uninterrupted use for twenty years, have gained a statutory prescriptive right to drip on to his neighbour's land. In the second case mentioned, a neat oaken fence, the "adjoining owner" has no such right as stated.—L.

[3454].—Stock Bricks.—Read "Bricks and Brickmaking," Weale's Rudimentary Series, and inquire on the brickfields in all the home counties for particulars of prices and varieties of make and qualities—or if comparatively small quantities only are required, get the necessary information at some of the large brick and tile yards, of which several are situated on the river side at Lambeth, and are advertised in the BUILDING NEWS. What do you mean by "best whites?" there are many descriptions of white bricks used in London, those of Suffolk and Essex, for example, and others of an entirely distinct variety, made from the gault clay at Barham, in Kent. But white bricks are not known as "stocks" in London, notwithstanding that in writing of London brickwork a contributor alludes to what is presumably a white Suffolk brick as a white stock; it may be a stock in its native place, where it forms the bulk of the "stock," but in London it is not usual so to name it. The London stock brick is made in all the home counties of a mild marly clay, and alternates from grey to yellow. Read article "White Bricks" in BUILDING NEWS 11th instant.—L.

[3455].—Aberthaw Lime is hydraulic. It is not so much used now as formerly—either because the quarries have run out, or that it has been subjected to competition with the produce of other quarries of superior quality or cheaper price. Portland cement and Selenitic lime have also taken its place for many purposes.—L.

[3456].—Choir Screen.—In Cistercian churches, the eastern arm being very short, the rood-screen was erected in the nave, the ritual choir extending under the crossing westward. Remains of the basement may be seen at Tintern, Valle Crucis, and Fountains, although in the last abbey the eastern arm was exceptionally long. I also found traces of the screen at Strata Florida. At Croxden its site has been determined.—MACKENZIE E. C. WALCOTT.

[3456].—Screens in Cistercian Churches.—The position of choir-screen in Cistercian Churches during the early days of the Order was three or more bays west of the crossing, which bays formed the ritual choir; afterwards, when asceticism cooled down, and the services grew more ornate, in place of the short sanctuary, grand eastern choirs were erected, as at Rievaulx, Fountains, &c. The choir-screen was then placed under the eastern arch of crossing, as in Cathedrals at the present time. At Kirkstall, where the original plan was never altered, the stone platform on which the stalls were erected may be seen, and occupies, I think, two bays west of crossing.—H. R.

[3457].—Weight of Iron.—A lineal yard of wrought iron, having a sectional area of one square inch, weighs 10lb. According to "Molesworth," a cubic foot of wrought iron weighs 481lb., and a cubic foot of cast iron 448lb.

[3457].—Weight of Iron.—Wrought iron averages in weight 485lb. per cubic foot. Multiply number of tons by 485, which will give weight in lbs., which reduce into tons by dividing by 2,240. Cube up the flanges and adopt same method, or use one of the many tables for flat iron such as is contained in almost every engineer's, builder's, and architect's book of tables, prices, or memoranda.—L.

#### STAINED GLASS.

HORNCastle.—A design for a memorial window to the late vicar of Horncastle has been prepared by Mr. Freedy, of London. The window is to be placed at the west end of the north aisle of the parish church.

NETTLETON.—A two-light window on the south side of the nave of Nettleton Church has just been filled with

stained glass, illustrative of the texts, "I am the Good Shepherd" and "The seed is the word of God." The work is by Mr. W. H. Constable, of Cambridge.

#### STATUES, MEMORIALS, &c.

THE SIMPSON MEMORIAL.—Mr. W. Brodie, R.S.A., has nearly completed his model of the statue of Sir James Simpson, which is to be cast in bronze by Messrs. Masefield and Co., of London. The surgeon is represented seated on a chair, in his academic robes, as if lecturing to his students. Mr. Brodie is also engaged on a bust of Simpson, which, with an accompanying bas-relief, illustrative of some feature of his career, is intended to be placed in Westminster Abbey.

THE VENDOME COLUMN.—The restoration of this historical monument is the work of two Paris founders, MM. Maillet and Thiebaut. The former provided the models of the pieces broken or lost, and the latter cast them. Of the original structure 4,000 kilos of bronze had disappeared, either taken by inveterate collectors, or sold by the Communists. In addition to that quantity, 11,000 kilos, of the old work had to be re-cast, as it was irreparably defaced by the fall, so that in all 15,000 kilos, or about 15 tons, of bronze has been run. The alloy of the metal is almost exactly that used for cannon. Several different parts were assayed, and in each the same quantities of copper, zinc, and tin were found. The 15,000 kilos, were distributed among 1,016 pieces, arms, noses, legs, flags, &c. The capital was wholly destroyed, and had to be reconstructed. The total weight of the bronze in the column is 150,000 kilos, originally cast from guns taken from the enemy. The shaft consists of 374 panels, each about one metre square. The price of the restoration will be from 250,000f. to 300,000f.

#### WATER SUPPLY AND SANITARY MATTERS.

BRIGHTON.—The Brighton Town Council proposes to erect duplicate engines and pumps at the Goldstone Bottom Waterworks, at a cost not exceeding £35,000.

GLASTONBURY.—We see, from the first quarterly report on the sanitary condition of this town, presented by Mr. Thomas Purnell, that the death-rate was less than nine per thousand during the quarter. This satisfactory state of things is said by the report to be "mainly due to a pure supply of water, a better system of drainage, sewer ventilation, and other well-directed sanitary efforts of the Board."

HORSHAM.—Mr. Greatorex, one of the engineers consulted in re the drainage of Horsham, has written to the Local Board expressing his inability to undertake the work at present.

#### LAND AND BUILDING SOCIETIES.

MONARCH BUILDING SOCIETY.—The seventh annual meeting of this society was held at the London Tavern on Monday. The sum of £19,646. 5s. 5d., being at the rate of 5 per cent. on the share capital and 4 per cent. on deposits, has been paid or passed to the credit of investors during the year, as detailed in the balance sheet. The investments of the society have realised £20,242. 10s. 4d., showing a surplus of receipts over disbursements on this account of £596. 4s. 11d. The total income from all sources during the year has been £72,137. 2s. 5d. The balance in favour of the society on the profit and loss account, after payment of all current expenses, is £3,735. 13s. 5d., and of this sum the directors recommend that £1,000 be added to the mortgage contingent fund, and that the balance of £2,735. 13s. 5d. be carried forward to next account.

THE NEW THOROUGHFARE FROM OXFORD-STREET TO THE CITY AND EAST-END.—The Metropolitan Board of Works have, for the purpose of relieving the traffic between the West-end and the City and East-end, commenced the construction of the new direct route between these points. The new street, which, when completed, will be one mile and a quarter in length, commences at New Oxford-street, and, passing by Southampton-row, where a large pile of offices and dwelling-houses will be demolished, will form a junction with Theobald's-road. At this portion of Theobald's-road the thoroughfare is only 30ft. in width, and as the new road in its entire length will be 60ft. wide, the Board have purchased the houses on the north side, which will be pulled down, and the site thrown into the road. Thence down the King's-road, across Gray's-inn-road down Liquorpond-street. The houses on the left-hand side of this street, as far as Back-hill, will be pulled down and set back 30ft. Thence an entirely new street will be formed by the removal of some hundreds of dwellings, and running at right angles to the St. Peter's Catholic Church, will pass through the Field-lane Reformatory into Farringdon-road, where an iron bridge will be thrown over the Metropolitan Railway. Leaving the Middlesex Sessions House on the left, the road will be carried across Red Lion-street and St. John's-square to St. John-street. Crossing St. John-street it will pass up Wilderness-row, which at this point up to the present time has only been available for pedestrians.



## Our Office Table.

**THE BOARD OF WORKS AND "THANKSGIVING" DAY.**—It appears that, with the connivance of the Houses of Parliament, the Metropolitan Board of Works has managed, after all, to saddle the ratepayers with the payment for the seats and refreshments provided by the members for their friends on "Thanksgiving" Day. In an Act of Parliament passed in the late Session (Chapter 97 local) it is recited that the Metropolitan Board of Works had incurred expenses for the accommodation of the local governing bodies of the metropolis on the occasion of the State visit of her Majesty and the Prince and Princess of Wales to St. Paul's in 1872, and questions had been raised as to the power of the board to defray such expenses. "And whereas such expenses were incurred by the Metropolitan Board of Works in the *bonâ fide* belief that in so doing they were not exceeding their powers, and it is expedient, therefore, that provision be made as in this Act contained with reference to such outlay," it is now enacted that the board may defray the expenses of structures and seats in Hyde Park and on Holborn Viaduct on the occasion of the State visit on the 27th of February, 1872.

**FIREPROOF ENAMELS AND LEATHER MOSAICS.**—Dr. Kosch, of the Chemical and Technological School at Vienna, has, according to the *Academy*, made an interesting discovery, which consists in the fact that certain colours may be made fireproof, and may thus be used for painting on china in precisely the tones required. The inventor has prepared a palette, on which his coloured enamels may be used like ordinary oil-colours, and may be painted in every conceivable combination of tints without being in the slightest way altered by the action of fire. Dr. Kosch at the same time makes use of a specially prepared enamel, which he spreads over the surface to be painted on, and by which the irregularities and porosities of the porcelain are as thoroughly concealed from view as if they were covered with thin smooth fine linen. The importance of such a surface-medium will be fully understood by all who are practically conversant with the difficulty of preventing the irregular and undue absorption of colour, which has hitherto stood in the way of producing artistic and carefully toned effects of colour on porcelain: This method has nothing in common with the "engobe" of M. Deck and other French ceramic artists, which requires to be strongly varnished or glazed before the colours can be submitted to the action of fire; and when Dr. Kosch has succeeded in adding a few more delicate tints of blue and green to his present range of colours, the important results of his ingenious invention will undoubtedly be speedily apparent. Under the direction of the Imperial Museum, some beautiful imitations of Delft and Urbino majolicas have already been made, in accordance with this method, at Messrs. Glowak and Klammer's porcelain works at Znaim. Another and scarcely less interesting invention, for which Austrian art is indebted to Dr. Kosch, is the fusion of gold, silver, and platinum with bronze, by which the most gorgeous effects are produced; gold fusion giving to the metal a splendid violet tint, silver a faintly-lustrous "Kioto" tone, and platinum a rich and deep black shade. The intermediate tints may be obtained by modifications of heat, while the same process may be applied with nearly equal success for cast iron. Dr. Kosch has succeeded in producing very novel effects by laying on one tone upon the other, as, for instance, coloured leaves and variegated arabesques on differently-tinted metallic surfaces; and his method is beginning to be extended to the ornamentation of leather, thus bidding fair to revive, at a moderate cost, the art of preparing leather mosaics, which owed its origin to Grolier, and is one of the most elegant of the numerous artistic adaptations of inexpensive materials to artistic purposes for which the sixteenth century was distinguished.

**MATTERS THEATRICAL.**—The theatre at Worcester is to be entirely rebuilt and considerably enlarged. A company has been formed, of which Earl Dudley is the principal shareholder, and Mr. C. J. Phipps, F.S.A., is the architect who has the direction of the works. Contracts have been entered into and the theatre will be ready for opening by New Year's Day.—The Philharmonic Theatre, Islington, has during the

last few months been entirely redecorated by Mr. E. Bell, under the direction of Mr. C. J. Phipps, F.S.A., architect to the new company, and will open again on the 26th inst.—The theatre at Nottingham opened again on the 10th, and the lessee commences a new term of tenancy. The whole building has been entirely renovated, and the lobbies and auditory redecorated in a very elaborate manner by Mr. Bell, of London, under the direction of Mr. C. J. Phipps, F.S.A., of London, at the cost of Messrs. Lambert, the freeholders.

**PROPOSALS TO WIDEN CITY STREETS.**—At the last meeting of the City Commissioners of Sewers, Mr. Deputy H. L. Taylor gave notice that at the next meeting of the Commission he would move the following:—"That it be referred to the Finance and Improvement Committee to consider the desirability of effecting a public improvement in the neighbourhood of Temple Bar, by widening Fleet-street on a line with the New Law Courts, now in course of erection, and to confer with the Metropolitan Board of Works, and report thereon to this Commission." At the same meeting it was resolved, on the motion of Mr. Deputy Hora, "That it be referred to the Streets Committee to ascertain whether any facility can be given to the vehicular traffic passing through Leadenhall-street by throwing part of the foot pavement on either side into the roadway at the eastern end of the street, and to report thereon."

**WOOD-BORING WORMS.**—Acting on a suggestion made by Mr. E. H. Clarke, C.E., in a letter to the *Field*, the directors of the Brighton Aquarium have intimated that they are willing to devote a tank to the purpose of experimenting with the various wood-boring worms upon different kinds of wood, with a view to discover the best method of preparation. Mr. G. Reeves Smith, the general manager of the aquarium, writes to say that if ship-builders, breakers, timber merchants, and others, who may meet with specimens of wood-boring worms, will forward them to the Aquarium, they will be gladly received, and every effort will be made to discover the best means of mitigating their ravages.

**DEATH OF DR. ANSTIE.**—The death is announced of Dr. Anstie, one of our best known sanitary reformers. A week ago he was called to advise as to the cause of an outbreak of sickness in a school at Wandsworth, and while engaged in examining into the defects of the sewerage he was seized with illness, which afterwards showed symptoms of blood-poisoning, and he died on Saturday last. Dr. Anstie was the originator and conductor of the inquiry into the state of workhouses which took place some years ago, which was the immediate cause of great improvements in those institutions.

**LAMP-LIGHTING EXTRAORDINARY.**—Some engineers in Baden have just contrived a most ingenious piece of mechanism, which has already been adopted in some of the public buildings and streets of Heidelberg. The object is to provide for the simultaneous lighting of all the gaslights of the town. This has been done both in Paris and with us in the Albert Hall by the use of an electric wire, but the German engineers have invented a method more simple and durable, according to the *Globe*. Their apparatus can be affixed equally to all gas jets, and it is made to act, not by any special mechanism, but simply by the increased pressure of the gas which is always laid on from the gasometer when the lamps should be lighted. The one act of turning on the gas at the main ignites it at all the burners fitted with the new apparatus. In achieving this result the designers did not really obtain any very practical advantage over the method of ignition by electricity. But they pushed this invention still further, and have provided that when the pressure is diminished at the main the gas can either be totally extinguished or let down to a thread. It is chiefly in the lighting of the streets of a town that the invention will be of practical use. Directly the gas is turned on the whole city will be simultaneously illuminated, and when in the early morning the pressure is reduced the light may be totally extinguished or gradually diminished.

It is proposed to erect a new clock and chimes in the tower of St. Peter's, Sudbury, and Messrs. Gillett and Bland, of Croydon, have been consulted in the matter.

A new public hall has been erected at Hinckley, to accommodate 400 persons. Mr. Goodacre was the architect, and Mr. Sharpe, of Wigston, the builder.

## CHIPS.

The prize offered by the Architectural Association as an Encouragement for Architectural Sketching has this year been awarded to Mr. G. D. Oliver, of 14 Southampton-street, Fitzroy square. The Drawings &c., submitted by W. Talbot Brown, A. W. Hennings, and S. Vacher, were honourably mentioned.

The foundation-stone of a new Primitive Methodist Chapel was laid at Dennington, Suffolk, on Monday week.

Local Acts of Parliament are expensive matters. In one just issued the Hornsey Local Board undertakes to pay £400 and the Metropolitan Board of Works the remainder of the expense in obtaining a new statute.

On Saturday afternoon the corner-stone of a Wesleyan school-chapel was laid at Cloughfold. The chapel will seat 470 persons, and will cost £1,400.

A new mansion is being erected at Whitwick, for Mr. W. Whetstone, from designs by Messrs. Goddard and Paget. The workmen were entertained to dinner by the owner of the house on Saturday week.

A memorial to the officers and men who fell in the Ashantee Expedition is to be erected in All Saints Church, Aldershot.

The foundation-stone of a new National School was laid at Guiseley, Yorks, on Saturday. The building will be Early English in style, and will cost about £2,000. Mr. Foggitt is the architect.

A new Free Church is about to be erected at Collessie N.B., at a cost of about £3,000.

An early British burial mound has just been opened on the Marsh, near Cookham. It rises from a perfect plain, to a height of 10ft. About 8ft. below the surface the bones of a child five years of age were discovered, with several flint scrapers and flakes.

A large extension of the town of Hull is about to be undertaken at a cost of £80,000, under the auspices of a member of the town council, who has bought the site known as the Westbourne Park Estate.

The parish-church of Rede, Suffolk, was reopened on Thursday week, after restoration under the direction of Mr. W. D. Wyatt, architect.

Mr. R. H. Nibbs, a Sussex antiquarian, has just published a folio volume containing fifty views of ancient buildings and localities in Sussex.

Archdeacon Holbech has given £2,000 towards the restoration of Farnborough Church.

At Madras a Fine Arts Society has been formed, under the patronage of the Governor, with the "object of promoting the cultivation in Southern India of art generally, by holding exhibitions, annually, if possible, and by every means in its power."

Carpenters' Hall, London Wall, which is of some antiquity, having escaped the Great Fire of 1666, is about to be demolished. Some of the moulded ceilings are very fine, and the decorations are interesting.

Coleman-street is to be paved with wood.

A new line of railway, the Hammersmith Extension, was opened on Wednesday week. It is a mile and a half long, and gives direct communication, via the Metropolitan District Railway, with the Mansion House.

A new church is about to be erected in Russell-street, Brighton, for the Rev. A. D. Wagner.

Mr. E. H. Currie, the Chairman of the Works Committee of the London School Board, stated, at the opening of new Board Schools at Camberwell last week, that the first sixty schools which had been built by the Board accommodated 57,042 children, the cost for buildings and sites being £9, 12s. 4d. per head.

Cottage Green Chapel, Camberwell, has just been reopened, after having been altered and redecorated by Mr. Cousins, of Wells-street, Camberwell, from the designs and under the superintendence of Mr. George Hicks, architect.

## CHUBB'S STRONG ROOMS.

Iron Doors and Safes;  
IRON LININGS, SHELVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB and SON,  
Makers to the Bank of England,  
57, St. Paul's Church-yard, E.C. } London.  
And 68, St. James' street, S.W.—[ADVT.]

## Trade News.

### WAGES MOVEMENT.

KIRKCALDY.—Seeing no prospect of the present strike being amicably settled, about 120 of the Kirkcaldy masons lifted their society money last week and left the town, the majority of them going to Glasgow and Edinburgh, where there is at present a demand for men. At their last meeting the masters unanimously agreed to keep the men out for some time.



**THE NORTH WALES QUARRYMEN'S STRIKE.**—The protracted dispute between Lord Penrhyn and the thousands of quarrymen employed in his works at Bethesda, has been brought to a close by his lordship conceding every reasonable demand made by his work-people, who, conscious that they were not asking for anything to which they were not fairly entitled, would have quitted the neighbourhood for ever rather than forego their claims. The principal concessions made by Lord Penrhyn are the removal of Mr. John Francis, the chief manager, and the appointment of Mr. Pen- nant Lloyd in his place; a minimum wage of 27s. 6d. per week, payable every four weeks instead of monthly, the men being still permitted to make as much as they can out of their "bargains" or "lettings;" an in- crease of pay to masons and others engaged in the quarries; and the granting of an inquiry into com- plaints against sub-managers.

## The Timber Trade.

The wholesale current prices for timber, deals, &c. are as under:—

Dyewoods per Ton.			
	£ s.	£ s.	
Barwood . . . . .	4 5	4 10	
Brazil, 2nd and 3rd . . . . .	20 0	25 0	
" unbranded . . . . .	14 0	20 0	
Brazillette . . . . .	3 0	3 10	
Camwood . . . . .	10 0	30 0	
Jamaica Fustic . . . . .	7 10	8 10	
Cargo wood, &c. . . . .	12 10	14 10	
Red Sanders . . . . .	6 10		
Bimas Sapan . . . . .	9 0	12 0	
Slam . . . . .	10 0	12 10	

Fancy Woods per superficial foot.

	s. d.	s. d.	
Honduras Mahogany, cargo aver.	0 4	0 5½	
Mexican . . . . .	0 4½	0 5½	
Tabasco . . . . .	0 5	0 6	
Cuba . . . . .	0 6½	0 10	
St. Domingo . . . . .	0 7	0 10	
Cuba " cedar " curls . . . . .	1 0	2 0	
Honduras . . . . .	0 3½	0 4½	
Australian . . . . .	0 3½	0 4	
Pencil . . . . .	0 2	0 3½	
Italian walnut . . . . .	0 4½	0 5	
Black Sea . . . . .	0 3½	0 4	
Canadian . . . . .	0 3	0 4	
St. Domingo satinwood . . . . .	1 0	1 6	

Ditto per ton.

	£ s.	£ s.	
Bahama satinwood . . . . .	7 0	9 0	
Kio rosewood . . . . .	14 0	20 0	
Bahia . . . . .	12 0	18 0	
Lignum vitae . . . . .	6 0	10 0	
Cuba cocus . . . . .	5 0	7 0	
Turkey boxwood . . . . .	5 0	16 0	
Indian teak . . . . .	14 0		

Per 120 12ft. 1½ by 11.

Quebec, 1st bright pine . . . . .	21 0	26 0	
" 1st floated " . . . . .	20 0	23 0	
" 2nd bright " . . . . .	15 0	17 0	
" 2nd floated " . . . . .	15 0	15 10	
" 3rd bright " . . . . .	12 10	13 10	
" 3rd floated " . . . . .	12 10	13 0	
Archangel, 1st yellow . . . . .	16 10	17 10	
" 2nd " . . . . .	14 10	15 0	
Pensacola pitch pine . . . . .	14 0	15 10	
Quebec, 1st spruce . . . . .	13 0	13 10	
" 2nd " . . . . .	10 10	11 10	
" 3rd " . . . . .	10 10	10 15	
St. John's . . . . .	10 0	11 0	
Prince Edward's Isle spruce . . . . .	10 0		
Memel 2nd yellow . . . . .	13 0		
" 3rd " . . . . .	11 10	12 0	
Stockaviken, 1 & 2 yel. 3 by 9 . . . . .	15 10	15 15	
" 3rd " . . . . .	2½ by 9	14 10	
" 3rd " . . . . .	2½ by 8	14 0	
Swartwick, 3rd " . . . . .	4 by 9	15 0	
" 3rd " . . . . .	3 by 11	15 0	
" 3rd " . . . . .	2 by 9	14 10	
Ljusne, 3rd " . . . . .	3 by 9	13 10	
" 4th white " . . . . .	3 by 9	9 10	
Petersburg, 1st yellow . . . . .	3 by 9	16 10	
" 1st white " . . . . .	3 by 9	12 15	
Wyburg, 1st yellow . . . . .		13 10	14 10
Gefle, 1 & 2 " . . . . .	4 by 9	15 10	16 0
" 2½ by 7	14 10		
Soderham 1 & 2 white . . . . .	3 by 7	10 10	
" 3rd " . . . . .	3 by 7	10 0	
" 1 & 2 yellow . . . . .	3 by 9	16 10	
" 3rd " . . . . .	3 by 9	14 0	
Ways, 1 & 2 yellow . . . . .	2½ by 9	15 10	
" 3rd " . . . . .	2½ by 7	14 10	
" 3rd " . . . . .	3 by 9	14 5	14 10
" 3rd " . . . . .	2½ by 7	13 10	
Gothenburg, 3rd yellow . . . . .	3 by 8	13 10	
" 3rd " . . . . .	3 by 11	14 10	
" 3rd " . . . . .	3 by 7	13 10	
Hernefors, 1 & 2 " . . . . .	3 by 8	14 10	
" 3rd " . . . . .	3 by 9	14 10	
Gefle, 4th " . . . . .	3 by 9	14 5	
" 3rd " . . . . .	3 by 11	13 10	
" 3rd " . . . . .	2½ by 7	13 10	
" 3rd " . . . . .	2½ by 9	15 10	
" 4 by 12	15 0		

Hudikswall, 4th white . . . . .	2 by 7	9 10	
" 2½ by 7	10 0	11 0	
" 2½ by 9	10 5		
Summas, 3rd yellow . . . . .	3 by 9	15 10	
" 4 by 9	14 10		
" 2½ by 7	13 10	14 0	
Soroka, 1st " . . . . .	3 by 11	15 15	
Sandarne, 3rd " . . . . .	4 by 9	15 0	
" 4th " . . . . .	3 by 11	14 0	
Kotka, 1 & 2 " . . . . .	3 by 10	12 10	
" 3 by 7	12 0		
Sandvik, 1 & 2 " . . . . .	3 by 9	15 10	
Nedir Calix, 3rd yellow . . . . .	3 by 9	15 0	
Per 120 12ft. 2½ by 6½ . . . . .			
Dram, 2nd yellow . . . . .	2½ by 6½	10 10	
" 4th " . . . . .	2½ by 6½	10 0	
" 3rd white " . . . . .	2½ by 6½	10 0	

Wainscot logs, per 18ft cube.

Riga crown . . . . .		6 0	6 15
" brack . . . . .		4 15	5 0
Memel crown . . . . .		4 15	5 10
" brack . . . . .		3 15	4 5
Staves per mille.			
Memel crown . . . . .		250 0	270 0
" brack . . . . .		220 0	230 0
Canadian standard pipe . . . . .		80 0	85 0

Lathwood per cubic fathom.

Petersburg . . . . .		10 10	
Dantzic . . . . .		8 5	8 10
Per load of 50 cubic feet.			
Pitch pine . . . . .		3 15	4 5
Swedish . . . . .		3 0	3 5
Stettin . . . . .		3 0	3 10
Riga . . . . .		4 0	4 5
Memel crown . . . . .		4 10	5 10
" best middling . . . . .		4 0	5 0
Quebec yellow pine, large . . . . .		4 10	6 10
" waney board . . . . .		5 10	6 10
" small . . . . .		4 0	4 10

## WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without the day's delay.—For samples and further particulars, apply to the MANAGER, at the Quarries Narberth-road, R.S.O.—[ADVT.]

## TENDERS.

**BRIGHTON.**—For the supply of 15,000ft. of 6in. and 3,000ft. 9in. glazed stoneware drainpipes, for the Corporation of Brighton. Mr. P. C. Lockwood, surveyor.  
Richardson . . . . . £525 0 0  
Stiff and Sons . . . . . 481 7 6  
Marshall . . . . . 465 12 6  
Ingham and Sons . . . . . 465 12 6  
Doulton and Co. . . . . 462 10 0  
Gibson . . . . . 438 0 0  
Fry \* . . . . . 412 10 0  
\* Acceptance recommended by Works Committee.

**BRIGHTON.**—For building a retaining wall in front of a cliff near the boundary of the Borough, for the Corporation. Mr. P. C. Lockwood, surveyor.  
Cheesman and Co. . . . . £740 0 0  
Bruton . . . . . 690 0 0  
Marshall . . . . . 650 0 0  
Lockyer . . . . . 535 0 0  
Wells and Miles\* . . . . . 503 0 0  
\* Acceptance recommended by Works Committee.

**GRANDISBURGH, SUFFOLK.**—For the erection of new schools, for the Grandisburgh and Burgh School Board. Mr. Ridley King, architect, Ipswich.  
Cunnold . . . . . £1,551 0 0  
Bennett . . . . . 1,450 0 0  
Luff (accepted) . . . . . 1,361 0 0

**HESTS.**—For the erection of a house at Water's-place Ware, for Mr. S. F. Buxton. Messrs. Smith and Austin, architects.  
Green and Son . . . . . £1,165 11 4

**KENT.**—For Church and small Capuchin Monastery at Greenhithe. Mr. J. L. André, architect.  
Sharp (accepted) . . . . . £1,700 0 0

**LONDON.**—For hall and offices for the Worshipful Company of Curriers, London-wall. Messrs. John and John Belcher, architects. Quantities by Mr. T. B. Insoll.  
Braid, Jopling, and Co. (accepted) . . . £4,117 0 0

**MONMOUTHSHIRE.**—For a colliers' hall and clubhouse at Cwmilly, for the South Wales Colliery Co. Mr. E. A. Landowne, architect, Newport, Mon.  
For Hall, Exclusive of Club.  
Phillips (accepted) . . . . . £1,150 0 0

**BATH AND OTHER BUILDING STONES OF BEST QUALITY**  
**RANDELL, SAUNDERS & CO., Limited.**  
Quarrymen and Stone Merchants.  
List of prices at the Quarries and Depots, also cost of transit to any part of the United Kingdom, furnished on application to  
[ADVT.] BATH STONE OFFICE: CORSHAM, WILTS.

**PORTLAND STONE OF BEST QUALITY**  
IN BLOCK OR SAWN.  
**THE PORTLAND STONE COMPANY (LIMITED)**  
QUARRYMEN AND STONE-MERCHANTS.  
STEAM SAW-MILLS.  
For List of Prices and Cost of Transit by Sea or Rail, apply to the PORTLAND STONE COMPANY (LIMITED).  
ISLE OF PORTLAND, DORSET.  
London Depôts at South Western and Great Western Railways.

## COMPETITIONS OPEN.

**ARLESEY, BEDFORDSHIRE, Sept. 30.**—For plans for Board schools and master's residences. T. J. Hooper, Clerk to the School Board, County Court Office, Biggles-wade.

**CARDIFF, Sept. 29.**—For designs for the proposed Free Library, Museum, and Science and Art Schools. Mr. E. Payne, Hon. Sec. The Wharf, Cardiff.

**HASTINGS, Sept. 24.**—For designs for a new Town Hall, with police offices, lock-up, public offices, &c. Premiums of £100, £50, and £25 will be given for the three most approved designs. Mr. G. Meadows, Town Clerk, 8, Bank-buildings, Hastings.

**ROCHESTER, Dec. 5.**—For designs for houses proposed to be built on the City Garden Estate. Premiums of £30 for the best, £20 for the second, and £10 for the third best designs. R. Prall, Town Clerk, Town Clerk's Offices, Rochester.

**Geometrical and Encaustic Tile Pavements**  
in every variety. Over Sixty New Designs at 5s. 6d. per yard super. "The Tiles are excellent, both in quality and colour."—BUILDING NEWS. "They are of great excellence in design—the material is not surpassed by any found in this kingdom."—Art Journal. "The patterns are remarkably good and effective."—Gardener's Magazine, &c. Designs and sample Tiles free on application to HENRY C. WEBB, Tiles, Worcester. London House, 114, Victoria-street, Westminster. Mr. T. Pulling, Agent.—[ADVT.]

## CONTRACTS OPEN FOR BUILDING ESTIMATES.

**BOLTON, Sept. 29.**—For the erection of a high level roadway between Deansgate and St. George's-road. Mr. J. Proctor, Town Hall, Bolton.

**CARDIFF, Sept. 30.**—For the erection of police stations. Mr. T. Dalton, Clerk of the Peace, Cardiff.

**DUNDEE NEW CATTLE MARKET, Sept. 23.**—Contract No. 1. For the construction of cattle market and roads in connection; and building retaining, boundary, and parapet walls, market-keeper's house, triperies, boiler and blood-houses, cattle-shed, and other erections. Contract No. 2. For the erection of slaughter-houses, lairs, carcass-market, dwelling-house, offices, stables, and other build- ings, and constructing sewers, &c. Mr. W. Mackison, Boro' Surveyor, Police-chambers, Dundee.

**EVESHAM NEW CEMETERY, Oct. 5.**—For the erection of chapels, lodge, boundary walls, &c. Mr. G. L. Eades, Clerk to the Burial Board, The Abbey, Evesham.

**GLAMORGAN, Sept. 30.**—For the erection of police stations at Llantrissant, Pwll, and Pontllynn. Mr. T. Dalton, Clerk of the Peace, Glamorgan.

**GREAT WESTERN RAILWAY, Oct. 5.**—For driving about 750 yards of 6in. heading at Portsoken, Engineer's Office, Paddington Station.

**HALIFAX, Sept. 22.**—For the removal of about 10,000 cubic yards of earthwork at Brookroyd Mills, near Halifax. Messrs. Horsfall, Wardle, and Patchett, architects, Post-office buildings, George-street, Halifax.

**HALIFAX, Sept. 22.**—For the construction of a reservoir at Brookroyd Mills, near Halifax. Messrs. Horsfall, Wardle, and Patchett, architects, Post-office-buildings, George-street, Halifax.

**HAMPTON, Sept. 26.**—For the hire and erection of a temporary school building for the Hampton and Hampton Wick School Charities. J. Cann, Langbourne-chambers, 17, Fenchurch-street, E.C.

**HORNCASTLE, Sept. 30.**—For the erection of two-90 quarter matings. Mr. R. C. Clitherow, High-street, Horn- castle.

**ILKLEY, Sept. 30.**—For the erection of eight first-class houses in Queen's and Upper Ridding's-road. Mr. G. Smith, architect, 9, Market-street, Bradford.

**LANCASHIRE AND YORKSHIRE RAILWAY, Oct. 6.**—For the erection of new workshops at Newton Heath. Mr. W. S. Lawn, Secretary, Manchester.

**MERTON, SURREY, Sept. 29.**—For the erection of three villas. Mr. R. B. Marsh, architect, 16, Mark-lane, E.C.

**METROPOLITAN BOARD OF WORKS, Sept. 24.**—For the formation of carriage and footways in Wilderness-row, E.C. Sir J. W. Bazaigette, C.B., Engineer to the Board Spring-gardens, S.W.

**OXFORD, Sept. 30.**—For the construction of about 3,700 yards of brick outfall sewer, 1,400 yards branch brick sewers, and 9,600 yards of pipe sewers, manholes, &c. Mr. W. H. White, Bath court, New-road, Oxford.

**SIR JOSEPH WILLIAMSON'S FREE SCHOOL, ROCHESTER, Oct. 3.**—For the erection of farm buildings at the school Farm, Wouldham. Mr. J. H. Andrews, Medway-terrace, Rochester.

**TAVISTOCK, Sept. 21.**—For the erection of Kelly College. Mr. C. F. Hansom, architect, 20, Richmond-terrace, Clifton.

**WITHERNSEA PIER, PROMENADE, & GENERAL IMPROVE- MENT CO., Sept. 30.**—For the erection of an iron pier with wood deck. F. F. Ayre, 17, Bowalley-lane, Hull.

**WYGGRESTON HOSPITAL SCHOOL, Sept. 28.**—For the erection of the boys' school in Southgate-street, Leicester. Messrs. Shenton and Baker, architects, Friar-lane, Leicester.

## LATEST PRICES OF MATERIALS USED IN CONSTRUCTION.

(From the Public Ledger.)

LEAD.			
Pig Foreign . . . . .	per ton	£20 2 6	£21 0 0
" English W.B. . . . .		22 10 0	23 0 0
" Lead Co. . . . .		22 5 0	22 15 0
" Other brands . . . . .		21 2 6	21 5 0
Sheet . . . . .		22 10 0	0 0 0
Shot Patent . . . . .		26 0 0	0 0 0
Red or minium . . . . .		23 15 0	0 0 0
White Dry . . . . .		28 10 0	29 0 0
ground in oil . . . . .		0 0 0	0 0 0



## IRON.

Pig in Scotland, cash	per ton	£4 1 3	£0 0 0
Welsh Bar, in London.	"	9 10 0	10 0 0
" Wales	"	8 15 0	9 5 0
Staffordshire	"	10 15 0	11 10 0
Rail, in Wales	"	7 10 0	8 0 0
Sheets, single in London	"	13 10 0	14 10 0
Hoops, first quality	"	12 0 0	12 10 0
Nail Rod	"	10 10 0	11 10 0
Swedish	"	17 0 0	19 0 0

## COPPER.

British—Cake & Ingot	per ton	£84 0 0	£86 0 0
Best selected	"	86 0 0	87 0 0
Sheet	"	90 0 0	92 0 0
Bottoms	"	94 0 0	96 0 0
Australian cake	"	86 0 0	88 0 0
Spanish cake	"	0 0 0	0 0 0
Chili Bars, cash	"	76 0 0	80 0 0
" Refined ingot	"	0 0 0	0 0 0
Yellow metal	per lb.	0 0 7½	0 0 8½

## OILS &amp;c.

Seal, pale	per tun.	£35 10 0	£0 0 0
Sperm headmatter	"	98 0 0	100 0 0
Cod	"	30 0 0	0 0 0
Whale, South Sea, pale	"	28 0 0	0 0 0
Olive Gallipoli	"	47 0 0	0 0 0
Cocoonut, Cochinchina	"	43 0 0	0 0 0
Palm, fine	"	36 0 0	0 0 0
Linseed	"	26 0 0	26 5 0
Rapeseed, English pale	"	30 5 0	0 0 0
Cottonseed	"	27 5 0	27 10 0

## TIMBER

Teak	load	£11 0 0	£13 10 0
Quebec, red pine	"	3 10 0	6 10 0
" yellow pine	"	4 0 0	6 10 0
" pitch pine	"	3 15 0	6 5 0
Quebec oak, white	"	8 0 0	9 0 0
" birch	"	5 10 0	8 0 0
" elm	"	7 10 0	8 0 0
" ash	"	7 0 0	8 0 0
Dantzic oak	"	5 0 0	8 0 0
" fir	"	3 10 0	5 10 0
" undersized	"	2 10 0	3 5 0
Riga	"	4 0 0	4 5 0
Swedish	"	2 10 0	3 5 0
Wainscot, Riga	"	4 15 0	6 15 0
Masts, Quebec red pine	"	4 10 0	6 0 0
" yellow pine	"	4 0 0	6 10 0
Oregon	"	9 0 0	12 0 0
Lathwood, Dantzic fm.	"	8 0 0	9 0 0
St. Petersburg	"	10 0 0	11 0 0
Deals per C., 12ft. by 3 by 9in	"		
Quebec Pine, 1st qual.	"	£20 0 0	£24 0 0
" 2nd do	"	14 0 0	16 0 0
" 3rd do.	"	12 0 0	13 0 0
Canada Spruce, 1st	"	12 0 0	13 0 0
" 2nd & 3rd	"	9 10 0	11 0 0
New Brunswick	"	9 0 0	10 10 0
Archangel, yellow	"	14 0 0	17 0 0
St. Petersburg yellow	"	13 10 0	15 10 0
Finland	"	10 0 0	13 10 0
Memel and Dantzic	"	0 0 0	0 0 0
Gothenburg, yellow	"	11 0 0	13 0 0
" white	"	10 0 0	11 10 0
Gefle yellow	"	12 10 0	14 0 0
Christiania	"	13 0 0	14 0 0
Other Norway	"	10 10 0	13 0 0
Battens, all sorts	"	8 10 0	11 10 0
Flooring Bds. sq. of lin.	"		
first yellow	"	0 14 6	0 17 0
" white	"	0 13 6	0 14 0
second quality	"	0 12 0	0 15 0

## BANKRUPTS.

(To Surrender in the Country.)

Henry James, Uppertorpe and Sheffield, accountant and builder, and Whittington, Derbyshire, brick manufacturer, Oct. 5, at Sheffield.

## SITTINGS FOR PUBLIC EXAMINATION.

E. T. Evans, Rhymney, builder and grocer, Oct. 15.

## DIVIDEND MEETING.

W. Kendall, Camborne, builder, Sept. 23.

## SCOTCH SEQUESTRATION.

John Renton, Glasgow, builder and quarrymaster, Sept 22, at 12.

## PARTNERSHIPS DISSOLVED

Clebury and Warham, Newchapel, Staffordshire, coal and iron masters, brick manufacturers, and farmers.—Jones and Griffiths, Garston, Lancashire, joiners.—Wood and Asquith, Barnsley, painters.—Clatworthy and Hirst, High-street, Camden-town, carpenters.—Emptage Bros., Margate, painters, plumbers, and glaziers.—Walter Cosser and Co., Belvedere-road, Lambeth, timber merchants.—Holliday and Lofthouse, Bradford or elsewhere, builders.—Yates and Perry, Leeds, engineers' tool makers.—Craig, Hogg, and Co., Wharf-road, City-road, iron merchants and engineers.—Gibson and Price, Barrow-in-Furness, bricklayers.—Upward and Hingworth, Great Queen-street Westminster, civil engineers.—James Turner and Son, Healey, near Sheffield and elsewhere, stone and lime merchants.

## PERFECT DAYLIGHT.

## WHY BURN GAS?

## CHAPPUIS'

## REFLECTORS

IMPROVE

## NATURAL DAYLIGHT

AND

## SUPERSEDE GAS.

## P. E. CHAPPUIS,

PATENTEE &amp; MANUFACTURER,

69, FLEET STREET,

LONDON.

## WM. GODWIN,

MANUFACTURER OF

## ENCAUSTIC &amp; TESSELATED TILES

for Pavements and Walls of

CHURCHES, ENTRANCE HALLS, &amp;c

IN MANY RICH COLOURS &amp; GREAT VARIETY.

DESIGNS AND ESTIMATES ON APPLICATION TO

WILLIAM GODWIN,

LUGWARDINE WORKS,

Withington, near Hereford.

## ENCAUSTIC AND TESSELATED

PAVEMENTS.

QUARRY TILE FLOORS.

Wall Tiles (plain and figured), English and Foreign.

Special Designs prepared. Well Selected Stock is kept.

DOULTON &amp; CO.,

CROWN WHARF, GROVE-ROAD, VICTORIA PARK.

ALSO GLOBE WHARF, MILE END, LONDON, E.

## A. J. TATHAM,

Patent Encaustic and Geometric Floor

TILE MAKER,

14, SOUTH WHARF, PADDINGTON BASIN, W.

Designs and Estimates supplied for Paving Churches, Entrance

Halls, &amp;c.

Experienced Workmen sent to any part of the Kingdom.

A Large Stock of Tiles always on hand at Paddington.

## MALKIN, EDGE, AND CO.

Patent Encaustic and Geometrical Tile

Manufacturers,

FOR CHURCHES, ENTRANCE HALLS, CONSERVATORIES

WALL DECORATIONS, &amp;c.

White Glazed Tiles for Baths, Dairies, &amp;c.

WORKS: BURSLEM, STAFFORDSHIRE POTTERIES.

LONDON AGENTS.—DOULTON &amp; CO., Crown Wharf,

Grove-road, Victoria Park, E.

## SUTHERLAND'S PATENT

IMPERISHABLE METALLIC ART TILES,

PICTORIAL AND ORNAMENTAL

MOSAICS, TABLETS, &amp;c.,

In Gold, Silver, and Colour.

ART TILE &amp; PAINTED GLASS WORKS

357, STRETFORD ROAD, MANCHESTER.

## PRIZE ENCAUSTIC TILES.

T. AND R. BOOTE were Awarded at

the INTERNATIONAL EXHIBITION (1872) a Prize

Medal for their Encaustic Tiles.

"FOR ADMIRABLE TREATMENT AND GOOD DESIGN."

"FOR NEW PROCESSES OF MANUFACTURE

OF ENCAUSTIC TILES."

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## THE BUILDING NEWS.

LONDON, FRIDAY, SEPTEMBER 25, 1874.

## ARTISTIC INDUSTRY.

THERE are constant accessions to the movement for educating, so to speak, the industry of Europe, and the competition is becoming excessively keen. But the endeavour is by no means of such recent origin as many suppose whose ideas upon the subject generally date from 1851. The great rivalry of that year was not the first of its kind, even in England, although its proportions excelled those of all others. There have since been developments of it in each of the three kingdoms, in Paris, Havre, St. Petersburg, Amsterdam, Berlin, Leipsic, Munich, and Mainz, with more or less extensive displays at South Kensington, the East End, and Islington, and this week another, upon an important scale, has been opened at Brussels. The new Artisans' Institute, about to be established in London, for the promotion of general and technical knowledge, is receiving great and generous encouragement, and the party of its members who visited Lambeth Palace last Saturday evinced a remarkable interest in the works of those who wrought the antique roofs, panels, and furniture. But, of course, the main object must be to pursue, from grade to grade, a system of practical instruction upon distinct lines, in association with the several branches of artistic industry in particular, to the rigorous exclusion of mere marvels of patience and dexterity, such as have been only too frequent hitherto. There is no reason whatever that our workmen should be inferior, as it has been a fashion to assume, to the French and Belgian lace-makers, the Austrian cabinetmakers, the Venetian glass-makers, the French bronzemoulders, or to the German cutters and enamellers of goblets. The processes of some manufactures are kept secret, while of others the mysteries have been lost; but, apart from these, neither is there any ground for supposing that the modern must necessarily be less admirable than the mediæval or the antique. It is true, indeed, the accumulation of wealth, combined with the desire for cheapness, tends to the production of fewer masterpieces; and changes of taste, fashion, and even religion have something to do with the different impresses stamped, from age to age, upon the work of the loom, the hammer, the chisel, and the potter's wheel. Thus, we must expect the use of reliquaries to gradually disappear with such elaborations as the famous Gloucester Candlesticks, the great mounted Mazer Bowls of Rheims, the Missal cases of pre-Reformation date, and so forth; yet every generation, not slavishly imitative, can be illustrated by distinct and rich characteristics of its own, if only its workers have faith in themselves and take a pride in their vocations. When the rich used silver in preference to china, the poor were satisfied with wood, earthenware not having come within their reach, in point of price, until a comparatively recent period, when it began by being of the clumsiest make and the coarsest material, resembling the provincial pottery of Germany and France. Wonderful improvements in this respect have been made, although we may never hope to light again upon the magic of the old artists who lined the palaces of the Moors in Spain with arabesque tiles almost transparent, who originated the Della Robbia ware, which gave a new renown to Florence, whence no specimen is now allowed to be carried away; or who tinted the rare Faience named after the Frank King Henry II., of which only fifty-two pieces are known to exist. Palissy, however, is not without his rivals in our day; the ivory carvers of

Dieppe need not hesitate to compare their works with those of the Germans and Flemings in the seventeenth century; and the porcelain manufactures of France are rapidly recovering their former fame, a result of methodical industrial teaching, and of stimulated emulation. In the opinion of many who have studied the question with intelligence and care, as a basis of technical education, the practice of drawing from Nature, and from models or plaster casts, is probably carried as far as is desirable in this country. This depends, however, upon the purpose in view, whether it be decorative or mechanical. It is true that we do not want a nation of artists so much as a nation of skilled artisans, building the best houses, doing the best carpentry and ironwork, and mixing the same colours for painting, in carpets, in prints, or in wall-colours; but there are many realms in which the artistic spirit may beautify and elevate the industry of the workman. No doubt the Germans push this theory to the extreme when they introduce the higher branches of physics, and even metaphysics, into their technical schools, reminding us of the writer who insists that a familiarity with the poems of Chaucer is essential to the training of a military man; and it is equally certain that we must not dream of very many Quintin Matsys arising among the blacksmiths, or Rossis among the pianoforte-makers, or Palissys among the mechanics of Perigord; still even their example is of the highest value, and a knowledge of principles is indispensable to their advancement and that of the craft at which they labour. Nothing can be more certain than that many most exquisite discoveries and adornments of industrial results—linking them in a manner, with the finer and more creative arts—have been due to the often-disappointed experiments and empirical perseverance of men who, untought, possessed, nevertheless, a spark of genius in their compositions. In reference to this topic, it is far from being decided, and should not be assumed until our opportunities of forming a judgment are greater, that the industrious classes in England are destitute of the innate instinct for Art which is ascribed to the same classes in France. The French towns are far more architectural and picturesque than most of ours; Paris is an inexhaustible lesson in herself, as are those of Luxembourg and the Louvre; and infinitely more solicitude has been bestowed upon the subject on the other side of the Channel than on this. Again, we have no special establishments under Imperial patronage, like the Gobelins and the Sevres, the Gothic glass works of Venice, or the Imperial manufactory at St. Petersburg; in fact, we have made no more than a beginning as yet; and it is far too soon to deduce general conclusions from imperfect experiments. Even the Netherlands occupy a foremost place in comparison. Not long ago the pupils of nearly fifty schools were invited to compete in drawing from Nature, drawing from copies, rectilinear, architectural, and technical drawing, both from copies and from models and designs of buildings made by the scholars themselves; and the numbers who responded was so great that it became impossible to attempt a complete discrimination. In another department of artistic industry—bookbinding, the Dutch, especially those of Utrecht, are unexcelled, their workmanship being admirable and their ornamentation of exemplary taste. This is a branch of industrial teaching upon which every consideration is bestowed; in the tooling, enriching, gilding, mottling edges, embossing, lettering, and choice of style. The Ghentois artists have some peculiar rules, of old date, in their workshops. They bind delicate editions in vellum; theology, they say, should be gorgeous, after a Gothic fashion; history plain and of ancient appearance; scientific books, severely sombre; and poetry gay and glittering. The people of the grey and ancient town feel a pride in their reputations for book-binding; hand it down

from father to son; cultivate it as an art; and are constantly striving to improve their processes. Thus they have long ago abandoned, or nearly so, the barbarous practice of having broad gold or silver borders, inlaid with gems, incrustations of turquoises and crystals, and similar extravagances; and this is due, unquestionably, to the influence of a higher art education, inspiring nobler ideas. Indeed, it is difficult to conceive at what point the artisan can be overtaught, or begin to teach himself, it being the case that a vast proportion of the industrious classes must be employed upon humbler tasks, since not all, or a majority, can be engaged in gold or silversmith's work, Minton or Copeland potteries, ivory engraving, decorative wood-work, mosaics, enamels, damascening, or the interior ornamentation of edifices, any more than all builders can be engaged upon the architectural features of the structures they assist in erecting; but nearly everything above the commonest mechanics admits of some fancy, or, as we prefer to express it, feeling; and many an artisan has risen high in his craft through the suggestion of a new design, whether in carving or colour. This has frequently been the case in the Parisian workshops of the Messrs. Fourdinois; and the chimney-pieces and jasper plaques produced by the Wedgwood firm. The great mistake often consists in confounding copying with studying, so that we are overwhelmed by spiritless reproductions of remote or foreign times, which exhibit little more than minute and faithful manipulation. Already have large numbers of British workmen advanced far beyond this stage, since the competitions established only a few years ago by the Society of Arts for the best examples in metal work, damascening, die-sinking, painting on porcelain, carving in wood, and book-binding. This applies also to keys, lock-escutcheons, door-plates, drawer-handles, and decorative mounts of various kinds, with window-grilles, balconies, balustrades, and ironwork of every species. It is not necessary, however, to invent new styles in order to secure originality, although, as in pottery, Bow, Chelsea, Bristol, Plymouth, Worcester, and Derby produced almost distinct types, as did Dresden, Delft, and Rouen, whose artisans are thoughtful students, individually, and not merely executing orders from patterns for their masters. Nevertheless, one result of ill-directed studies is a habit of modelling from the Gothic, the Renaissance, or some other style, peculiarly preferred by the workman. It is so with painting. Nearly every master, and certainly every school, has direct imitators, whom a healthy artistic preparation would guard against this sort of slavery. A part of the explanation lies in the fact that whereas one order of the community insists upon searching the markets of the earth for undeniably genuine sixteenth, seventeenth, and eighteenth century furniture; for vases and covers of priceless *gros bleu* or *rose du Barry*; for exquisite trifles from the cabinets of kings and queens; for crackle glass, buhl, and bronzes belonging to rare sets, another, with similar tastes but not similar means, employs the modern artificer to sculpture its tables, chairs, and bedsteads, and darken them with the aspects of age, to mimic the tea-services and flower-stands of Marie Antoinette; to set up pedestals of which nothing is malachite and nothing is porphyry except the painting, and it is thus that an immense amount of spurious trash is presented to the world. Of course these imitations represent a great deal of ingenuity, and could not be produced without a certain degree of industrial art industry; but they do no justice to the genuine workman or the period in which he labours. In one respect, modern design has shown that it requires no assistance, or scarcely any of the invention of other epochs. That is to say, the England, France, Italy, and Spain of the present day, not to speak of Sweden, Armenia, Wallachia, and Greece, are in advance of nearly all their predecessors in



the matter of jewellery. It is true that Etruria, Egypt, Assyria, India, Persia, and Byzantium did bequeath some rich, and many delicate fancies; but for variety, imagination, perfect setting, and every kind of grace belonging to jewellery, that which we owe to the artists of our own times is incomparable. The older work was not only monotonous but coarse, while that of the nineteenth century has been improving in all respects since the nineteenth century began. It is impossible not to perceive in this the influence of education upon at least the more luxurious departments of industry, calling, as it does, upon taste, knowledge in a high degree, an infinite plastic power, and incessant invention. It is an excellent sign, therefore, that instead of the movement slackening, it is constantly acquiring new force, becoming better understood, and spreading over a more extensive area.

#### THE SUBURBS.—I.

GLANCING at a few of the many suburbs which skirt this huge city, one thing becomes more conspicuous to the suburban resident or city stroller than perhaps the mere interest of the localities themselves, namely the "manufacture" (we cannot call it building) of a class of houses of moderate size to supply an unceasing demand. A constructive trade we cannot call the ceaseless activity displayed in "running-up" in all directions of buildings with no other pretence to the name that they have foundations, and are immovable structures, we will say—at least for the nonce. The trade of house-manufacture must indeed be a flourishing one when we see whole rows of brick shells and flimsy partitioning run-up in the course of a few weeks, decked with all the ready-manufactured devices of the mason and plasterer, and let or sold ere the brick shells have evaporated their moisture, or the plastering has scarcely had time to set, to say nothing of drying. The manufacture of bricks themselves is not one wit more mechanical than the manufacture of the class of dwellings we are referring to. The demand for houses is such that we cannot make plans and models for every house; the mental labour must be economised in the same way as the printing-press multiplies a thousandfold the work of an author. House-building of a certain class is as much a trade as that in any article of daily consumption; houses must be turned out of hand by the score, and therefore all we have to do is to provide the best mode of doing it, and the best models. It is far different in small towns, where every house is built to suit the peculiar wishes of the occupant or proprietor; or, in the larger class of residences which are erected to meet the views of certain individuals. In these cases the architect is, luckily, consulted, and each house has a character and arrangement of its own, impressed by the taste or inclination of its future occupier. Architects need not fear the consequence of the house-manufacturing trade. Like all other articles multiplied *ad infinitum*, houses built by the score, or by fifties and hundreds, become "common," and there is a natural desire in human nature to be "a little out of the common." But on the other hand, "house-manufacture" cannot cease. The majority must be housed, and if the necessary capital remains in the hands of a few, the manufacture and trade in small houses must continue to be an investment of no small remuneration.

The "speculative builder," whose name is legion, and includes every kind of occupation, from a small publican to a brickburner, takes a plot of land on lease anywhere which promises a chance of success, and builds a dozen or a hundred houses, containing from six to a dozen rooms each, as he knows the requirements of the neighbourhood would justify. In any of the suburbs of London the speculation is sure of being a paying one, so long as the houses placed on the land are fairly

within the required accommodation as to rooms. There is not that risk which one often finds in some country locality where temporary dulness of trade often makes such properties hang heavily on the speculator, or which suddenly depopulates a neighbourhood. It is to be noted also in the latter localities a better kind of workmanship is required; while in proportion to the greatness of the demand will the manufacture of this kind of work deteriorate. So we see not only does the speculator in the suburbs of a large town reap advantage in proportion to the extent of his enterprise, but "scamping" receives its reward. He can manufacture his tenements wholesale at the cheapest rate with the cheapest materials, and let or sell them before they are finished, so ignorant or inconceivably stupid is the class of tenants or purchasers he lets or sells them to. It is not exaggeration when we say the rents received for this kind of house property are such as in a few years to pay off the capital or mortgage, besides returning a good profit upon the outlay.

Our more immediate object is, however, to point out the doubtful value of this property, in the long run, the mischievous results arising from a "manufacture" that is under no control, but which opens such unparalleled means of deception. The purchaser of a coat or a steam-engine gets at least some satisfaction in the thought that if he goes to a respectable tailor or engineer, he obtains the advantage of a good cut, or a well-thought out machine, in the production of which a good model has been followed. A large manufacturer does not mind spending a few hundreds or thousands of pounds in a patent, or improved manufacture, of which his customers receive the benefit, however extensive may be the sale. It is not so with the hirer or purchaser of a house: he has no guarantee of its fitness or construction. In the one case, efficiency has been settled; in the other, it has to be found out by costly experience, simply because a manufacturer has his credit at stake, and in the other case he has not. House-manufacture is not a legitimate manufacture at present. Anybody, however ignorant or however culpable, can run-up houses for sale. It is no special business, and the cheaper and more "scamped" the work, the better it pays.

These remarks are forced upon us when we see the reckless amount of scamped work in the suburbs of London. Taking some of those building estates in the vicinity of Brixton, Camberwell, Upper Holloway, Finsbury Park, and some districts in the West of London, we find a total perversion of all proper construction. Overlooking incompetent architectural taste, we constantly see party walls without footings commenced on the existing level of ground, and so carelessly bonded and flushed in with mortar that one may thrust a stick through them, or knock out a brick at the back of flues. As for plumb walls and chimney jambs, it is not uncommon to find a deviation of 3in. in the height of a story, which the plasterer has to "dub out" as best he can.

Rectangularity is even more glaringly violated, and if the upholsterer does not test the diagonal dimensions of his rooms, he in all probability finds himself in a dilemma when the carpets come to be laid down. Paterfamilias, too, finds to his vexation that his new cheffonier, or bureau, or bookcase does not fit its intended recess. This carelessness in setting out is not exceptional, and we know of some cases where carpets have been sadly cut to waste, and all kinds of pleatings and coaxings resorted to. This appears one of the sins of house-manufacture of a certain class, and when added to graver evils of bad materials and sanitary imperfections, is enough to aggravate the most unruined disposition. We well know new roads are not always found at right angles, but when this irregularity occurs, the difference can with a little ingenuity be thrown into the divisional

walls, or an extra cupboard or two obtained between the party-walls, always a grateful bounty to materfamilias or her housemaid. Other more serious evils we will notice in another article; in the meantime, we would suggest the urgent desirability of doing something to remedy the crying evil. Why should not these house-manufacturers or speculators pay for a good plan to start with—something that will reflect credit on themselves, and credit on the community they build for, as well as upon the science of house-building itself, while the example would be a stimulus to good building. A hundred pounds for a model house, offered in competition, would be scarcely felt, while in a dozen houses the money would be absolutely saved.

#### THE BEAUTIFUL IN ART.—IV.

COMPLEX HARMONIES, AND ARCHITECTURAL PROPORTION.

ALTHOUGH we cannot say that one form is more suitable to a certain sound or colour, there are certain sensations which have a kind of community of feeling. For instance, a vast structure is more in harmony with a sublime strain of music, a slow time in movement, large masses of colour, and depth of tone and contrast, than a sprightly air of music, or a bright variety of colour, and modulated lights and shadows. Between glare and sparkle and rapid movements; sombre colours, lights and shadows, and slow movements, there exists a kind of harmonious relation which the most unimpressible mind feels. It would be flagrantly and violently opposed to our feelings of propriety to hear the "Dead March" played at a convivial merrymaking, or to see a buffoon or a mountebank at a recital of a tragedy.

Dramatists, poets, and painters have drawn their grandest pictures from a keen perception of this harmony of connection, though it is a little strange that architects commit glaring improprieties occasionally. When one sees, for example, a frowning machicolated tower placed in proximity to the most crowded thoroughfare in the world, actually overlooking the most commercial of cities; or all but portcullised gateways designed for Christian communities and municipal palaces, we reach the *acme* of burlesque. The grave and gay, the solemn and festive, are often jumbled together in composition, as when we see heavy masses of rectangular outline brought into contact with light and sportive forms. This leads us to Expression in architecture, as one of the most marked of those qualities upon which to estimate the success of an architectural design. When we compare Dance's Newgate Prison, Chambers's Somerset House, Soane's Bank of England; or go back further and compare the churches of Wren, Gibbs, and Hawkesmoor and the palaces of Vanbrugh, we are compelled to admit, with all our modern predilections as to style, that there is something about those edifices which proclaim their uses, and not unfairly put to the blush works of more modern taste, in spite of our boasted truthfulness in material and construction. The fact is, their authors worked in compliance with the obvious harmony referred to; and if we occasionally saw a Protestant church masked in a heathen portico, or a Chinese pagoda doing service as a garden-seat, they were at least as convertible and appropriate as any of those transmutations which modern "Medievalists" so assiduously thrust upon our notice.

So powerful has been the influence of the harmony of corresponding sensations, that many ingenious hypotheses have been invented to account for architectural harmony. Among the most ingenious and valuable of these theories may be ranked that of Mr. D. R. Hay, of Edinburgh, or his Harmonic Law of Nature and its Application to Architectural Beauty. We are bound to admit at



the onset that the beauty of Greek proportion and design so far exceeds what we might expect to find from so early and yet wonderful a people as the Ancient Greeks, that we are somewhat constrained to think in their case some canon of form, or the use of some geometrical formulas, existed, and that the young artists were early trained in those æsthetic exercises which enabled them to hold their place in architecture, as they did in poetry, philosophy, and politics. We know, further, that a "canon of proportion" existed as to the human figure, known as the canon of Polykletus; and that Pythagoras, who founded the third school of Greek Philosophy, and was so distinguished as an arithmetician and geometrician, regarded numbers as the basis of all things, and that his system of philosophy preceded the great period of Athenian excellence in architecture. Though he left nothing in writing, his system, handed down by his school, gives us an idea of his philosophy of Beauty. He attributed to numbers a real existence, and believed them to be the elements upon which the beauty of the universe depended, and out of which it was constructed. The numerical relations of sounds was regarded as the foundation of all harmony. The Pythagorean system of numerical harmony in sound and form is applied by Mr. Hay to the proportions of the Parthenon, and its simplicity, at least, may be a recommendation in its favour. Mr. Hay's theory is based on the fact that a figure is pleasing to the eye in proportion as its fundamental angles bear certain proportions to each other, these proportions being the same that the vibrations in a chord of music bear to one another, and as "the whole science of musical harmony depends upon the simple division into which a monochord, when in a state of vibratory motion, resolves itself by nodes into one-half, one-third, one-fifth, and one-seventh, with their multiples one-quarter, one-sixth &c., so in like manner the whole science of proportion, or harmony of form, arises from a similar division of the quadrant of a circle. The highest standard of symmetry so estimated is thus deduced from the law that the angles of direction must all bear to some fixed angle relations expressed arithmetically by the smallest natural numbers." Such is Mr. Hay's theory in his own words. No other law, as he says, is so simple, and it is but another form, as he observes, of that great law of *least effort* which pervades the system of the universe. The elements of the Pythagorean system of harmonic numbers are thus made use of. Those were the indivisible monad (1); the duad (2), the union of one monad with another; the triad (3), the union of the monad and duad; and the tetrad (4), the union of two duads, which tetrad was considered a perfect number. From the union of these four elements arises the decad (10), the number comprehending all arithmetic and harmonic proportions. These elements united in the following order thus—

$$\begin{array}{ll} 1 + 1 = 2 & 2 + 3 = 5 \\ 1 + 2 = 3 & 3 + 4 = 7 \end{array}$$

we find make a series of harmonic numbers 2, 3, 5, and 7, which with their multiples are the numerical elements of all harmony. The more simple the relations the more perfect is the harmony.

We will not pursue this theory further here, but there can be no doubt the senses of the ear and eye become impressed with analogous harmonies or vibrations, or, in other words, that the combinations of sounds which the ear regards as harmonious are analogous to those forms which the eye regards as most pleasing, i.e., the estimation by halves and thirds and other simple proportions of the assigned unit. It is also a reasonable inference, from what we know of the physical structure of the eye and ear, that their reception of impressions from external nature are regulated by simple and similar means; thus, as the ear can appreciate exact subdivision of

intervals of time, so the eye can appreciate those intervals and divisions of space which are simple and exact. Hence in this theory the angles of direction all bear to some fixed angle the same relations which different notes in a chord of music bear to the fundamental note—these relations being expressed by the smallest numbers. The ear and eye both convey their impressions of simplicity to the mind with the least effort, and the mind appreciates them. Mr. Hay calls the right angle the fundamental angle, which he subdivides into the harmonic parts explained above. Four elementary forms belong to the forms employed in architecture, viz., the equilateral rectangle; 2, the oblong rectangle; 3, the equilateral triangle; 4, the isosceles triangle. We have not space to go into this interesting subject further. Most of our readers are acquainted with the theory, which, whatever may be its practical usefulness as applied to our very complex conditions of architecture, is still deserving of study, and explains, as far as it goes, the interesting analogy that exists between the sensations of sight and sound.

Mr. Penrose, whose investigations at Athens in 1846 enabled him to make some careful measurements and calculations, appears to have borne out the theory of harmonic proportions as applied to the portico of the Parthenon, to which subject we may perhaps allude in our next.

## THE MANUFACTURE OF COLOURS FOR PAINTING.\*

(SECOND NOTICE.)

THERE are a great many processes for the manufacture of white-lead, and as it forms the basis of nearly all pigments, it should be perfectly free from admixtures, as chalk or Meudon white, which are added by house-painters, but which impair its consistency and durability. To prevent its acquiring a brown tinge it should be kept in closed vessels.

Besides the processes described in our last article, there are others we may briefly notice. The Dutch process carried on at Lille, which has become a large manufacture, consists in exposing sheet-lead to the vapours of vinegar and to the gases of stable manure. The vinegar is from inferior beer, and contains little acetic acid. The weight of real acetic acid is less than  $1\frac{1}{2}$  per cent. that of the lead, and nearly the whole of the metal is transformed into white-lead, says M. Pelouze, who has examined the process carefully. The theory is therefore simple. Oxidation is produced by the air, and the vinegar, volatilised by the fermenting manure, unites with the oxide of lead, which is then displaced by the carbonic acid set free by the manure. M. Pelouze has found also by experiments the necessity of employing in the manufacture "an acid which may produce with oxide of lead a basic or subsalt which may be decomposed by carbonic acid."

Another process, known as the French or "Cliché Process, by Thénard," is based on the following reactions. "If a solution of basic acetate of lead (Extract of Saturn) be treated with carbonic acid, part of the oxide of the salts is converted into carbonate of lead, and the remainder becomes neutral acetate." By adding a proportion of litharge or oxide of lead to the latter solution, this becomes basic again by the solution of the oxide. Thus by a continuous production of basic acetate white-lead is formed.

Other processes, as the Pattinson, Woolrich, Versepuy (in which granulated lead is comminuted by friction, and transformed into white-lead by absorbing carbonic acid), Wood and Benson, Mullin, Sewell, Crompton, &c., show various ingenious means of separating the metallic oxides, or chemical reactions

more or less perfect by combinations of acids and oxide of lead, as litharge, massicot, &c.

As white-lead is a powerful poison, its manufacture is attended with much fatality among those engaged, and many plans to prevent the inhalation of the impalpable powder have been devised, as those of Ward and others. The process of pulverising white-lead is particularly objectionable by the light dust produced, and its inhalation leads to colic and inflammation of the viscera. This is prevented by modes of separating the non-corroded metal from the white-lead under water; or by grinding in hermetically-closed boxes; and by the manufacture of white-lead ground in oil, instead of lump.

Various processes for the manufacture of zinc white, based upon the oxidation of zinc vapours by the oxygen of air, are described. Baryta whites (sulphate of baryta), a heavy spar is employed, and this white, fixed with glue size, is largely used in the manufacture of paper hangings. Coming to Blues, we have Ultramarine, Cobalt, Prussian, Mineral, Indigo, Azure, &c.

That extensively-used and beautiful blue called Prussian blue, was discovered in 1720, by Diesbach, of Berlin. All chemists regard it to be a combination of cyanogen with iron in two states of oxidation; or the proto-cyanide and sesqui-cyanide of iron in varying proportions. The animal substances used in the manufacture are dried blood, hair, wool, waste from skins, flesh, animal oils, soot, bone black, &c. Prussian blue is considered next in purity of tone to ultramarine and cobalt, but has a stronger colouring power of 10 to 11 times with equal volumes. Mixed with white-lead its hue is slightly greenish. One part of Prussian and ninety of white produce a sky blue. Mixed with from fifteen to twenty times its weight of chrome yellow, it makes a beautiful and vivid green, though not very durable. This blue is used with glue, size, or oil. It may be useful to note here that damp walls destroy Prussian blue by the nitrate of lime they contain. The process generally employed is that in which the ferro-cyanide of potassium (yellow prussiate of potash) is used, prepared as follows. The mixture consists of 75 parts of good carbonate of potassa, 50 parts of horn or leather waste, 3 of iron filings. The potash is introduced into a furnace, and when in complete fusion, iron filings are introduced and mixed with an iron tool, heated red. Animal charcoal or horn waste is combined. The liquors are boiled and evaporated, and on cooling give crystals of the ferro-cyanide. The calcination of the substances is carried on in a reverberatory furnace.

Without referring to the many recent processes for the manufacture of ferro-cyanide of potassium or Prussian blue, we may allude to the English process, which gives as fine a blue as that of Berlin, and is like that employed in France. Ox-blood mixed with oxide of iron is dried in a reverberatory furnace and kept stirred; the dried product is then broken in pieces while hot. This process requires a high shaft to carry off the fetid vapours. The blood "lye" is prepared with soda in the proportions of 1 part of soda to 6 of dried blood. The mixture of oxide of iron, blood, and alkali is calcined in a large cast iron crucible. The calcining and desiccating operations are conducted simultaneously. The contents are thrown into cold water, boiled, and filtered twice. The liquors are ultimately treated with alum and sulphate of iron, and the precipitate of Prussian blue is washed several times by decantation with pure water. This blue is collected upon cloths which are folded and dried.

The addition of a certain quantity of acid sulphate of potassa preserves the colour of Prussian blue, and allows its use with vegetable and essential oils. This blue will combine with ammonia, and the result is a blue finer and more durable than the ordinary article.

\* "On the Manufacture of Colours for Painting" By MM. RIEFFAULT, VERGNAUD and TOUSSAINT. Translated by A. A. FESQUET, Philadelphia.



Cobalt blue is the discovery of Thénard, and is perhaps the finest blue we possess, and may be substituted in painting for ultramarine blue, which is expensive. It has a violet hue, which makes it more serviceable to the artist than Prussian in some combinations, and for sky effects. Messrs. Bourgeois and Coulomb have succeeded in giving this blue a sufficient body for artistic purposes. Exposure to the air renders the tones more intense. It is a basic phosphate of cobalt, and is prepared by calcination with alumina, which latter ingredient gives it its intensity. Cobalt blue mixed with whites gives beautiful light tones. It is very durable, and resists action of fire, acids, and alkalies.

Indigo, another blue well known in the arts, was introduced into Europe in the sixteenth century. The colouring matter is derived from the leaves of plants called *Indigotifera*, indigenous to India and Mexico. They belong to the family of Leguminous plants (*Diadelphina decandria*). The indigo is extracted by fermentation in water of the leaves. Lime-water is used to separate the indigo, the liquor being run into tanks and the deposit dried. Indigo loses its blue colour by contact with deoxidising substances; it is not affected by weak acids; it is turned yellow by nitric acid. Commercial indigo is never pure, the pure being obtained by sublimation in closed vessels. It is adulterated by various substances, though it can be detected by a caustic lye of potassa.

Ultramarine has been the subject of great chemical research. Real ultramarine is extracted from *lazulite*, *lapis lazuli*, a mineral of the granitic rocks. This blue, which is the most perfect used, is unchangeable, even under intense heat. The mineral *lazulite* comes from Prussia, China, and the Great Bucharra. It is an opaque stone of dirty blue colour, with gold spangles scattered in the gangue. The stone is disintegrated by heat and then thrown into cold water. Afterwards it is powdered, mixed with mastic of resin, wax, and boiled linseed oil. The pasty result is wrapped in cloth, kneaded in hot water, and the colour is thus expressed. The first water is dirty and is discarded; the second gives a blue of the first quality, the third a blue inferior, and the fourth a still paler product, and so on; the pale product is called *ultramarine ash*. The residuum of the liquors after settling is ground and then dried. Ultramarine is often adulterated with cobalt blue, Prussian and indigo. Nitric acid and incandescent charcoal tests may be used either for cobalt or indigo.

Artificial ultramarines are manufactured in Italy. Goethe, in his travels in Italy, alludes to a vitreous substance formed in lime-kilns used in Sicily. It is carved into slabs which are used instead of lapis-lazuli for the decoration of altars, &c. Ultramarine can be manufactured from soda ash, powdered sulphur, sulphate of iron, and powdered clay, mixed in boiling water and evaporated to dryness. The powdered mixture is then calcined. Other processes are used, but we have not space here to enumerate them.

Passing on to yellow pigments, we have, Yellow ochre, Rut or rivulet ochre, Raw Sienna earth, Mars yellow, as iron compounds; while Naples yellow, Chrome, Cologne mineral gamboge, Antimony yellow, etc., are manufactured from antimony, lead, chromium, and arsenic; and some others, as *Avignon*, *saffron* &c., are extracted from vegetable substances. Unfortunately the bright tones of yellow are wanting in fastness and durability.

Ochres or clays are coloured brown, yellow, red, reddish-yellow, but by calcination they all become red or brown. Their colour is due to the oxide of iron they contain, and all ochres are compounds of clay and oxide of iron. Yellow ochre has an earthy-looking tinge, and there are a great many varieties of this useful pigment. When it is calcined water escapes, and the ochre becomes red and is known as red-ochre. The good qualities of

ochres are in direct ratio to the number of washings or floatings they have undergone. The process for removing the water from the hydrated oxide is by breaking the ochre into pieces and then subjecting it to calcination on a heated plate of cast-iron, the heat being applied below. When the degree of colouration is reached, it is quickly cooled by being thrown into water. The deposit undergoes washing several times, and is dried in the open air. Fine ochres are ground in a mill and floated in large cisterns.

Of red colours, we may glance at a few of the most useful in the arts. Such are Red-ochre, Rouge, Iron minium, Red-lead, Cinnabar and Vermilion, Madder lake, Madder carmine, Lakes, Indian red, Cochineal carmine, etc. The calcination of ochres produces a variety of reds, verging from the orange-yellow to the carmine or violets. Mars reds, browns, and violets are prepared from pure copperas. Iron minium is a colour prepared in Belgium, by M. de Cartret. It is a mixture of clay and oxide of iron. This colour is beginning to be extensively used, and is more economical than red-lead. Red-lead, or minium, is composed of two parts of protoxide and one part of binoxide of lead. It is prepared from pulverising yellow litharge and submitting it to a red heat, when a portion of the protoxide passes to a state of binoxide. It is also made by decomposing at a high temperature white-lead or carbonate of lead. This salt loses its carbonic acid and leaves a residuum of red-lead.

Vermilion we find in the natural state as red sulphide of mercury; it is also artificially manufactured, as at the mercury mines of Idria, by grinding finely in revolving tuns 85 parts of mercury and 15 of sulphur. The mixture is then heated in cylinders and sublimed in clay condensers. The vermilion is obtained by grinding the cinnabar in water. Holland has a renowned vermilion. It is also prepared in the wet way by solutions, for which there are several processes, using certain proportions of mercury, sulphur, hydrated potassa, which mixtures are heated at a temperature suitable to the red required.

Madder lake is a product from a plant (*Rubia tinctorum*). Madder lakes are variously adulterated with powder of tinctorial woods, &c. The redwoods of Brazil, Santa-Marta, Pernambuco &c., contain a fine colour matter of crimson hue. The lakes are obtained by digesting the powdered woods in water containing one-twentieth of tartrate of potassa and precipitating with alum.

Carmine is prepared from an insect, cochineal, of the genus *Hemiptera* of the family of gall insects. It is a native of Mexico, though now raised in the Canaries, in India, Spain &c. Cochineal is, from analysis, composed of carmine, the colouring principle; coccine or raw animal colouring material; stearin, and olein, phosphate and carbonate of lime, chloride of potassium, phosphate of potassa &c. The process ordinarily employed is to dissolve the cochineal at a moderate temperature in water, holding a proportion of carbonate of potassa; powdered alum is added to the solution of cochineal, and attains a carmine red; the liquor is then decanted and heated, and the deposit of carmine is drained upon a linen cloth and dried.

In another notice we may allude to the drying and adherence of colours.

### WHITE BRICKS.—III.

#### MACHINE MOULDING.

**M**ACHINES for moulding bricks are so numerous that it would be utterly impossible to enumerate them; but the principles upon which they act may be classified under three heads. Under the first head are comprised those which are formed by passing the clay direct from a vertical or horizontal pug-mill through a suitable mouthpiece.

These mouthpieces are generally of three kinds. 1st. The simple die, or the die fitted with cores, to make hollow bricks. The work produced by these machines, unless the clay is very mild, is generally very unsatisfactory. Some improvement may be made in this mode of manufacture by fitting a cutting apparatus to the pug-mill, similar to that described in the article, by the author of this paper, on Firebricks, as the vertical rollers of the apparatus will keep the stream of clay straight and true. Bricks, however, manufactured on this system must always be unsatisfactory, as the centre of the stream of clay moves faster than the sides, which are retarded by the friction of the sides of the mouthpiece, and the stream of clay frequently swells up and rises from the rollers of the cutting-frame, and the brick is apt to contract unequally in the burning. 2nd. The water-die system of mouthpiece, in which the die is made hollow, and the mould is lubricated by a constant stream of water being forced through it by hydraulic pressure, or by a forcepump. This mould produces very well-shaped bricks if care is taken to keep up a good supply of water without overdoing it, as in that case the brick become too much softened. With some clay such a system would no doubt answer extremely well; but with strong clay it is difficult, from the softened state of the surface of the brick, to prevent too great a contraction in burning, which causes the face of the brick to be full of cracks. 3rd. The roller mouthpiece system, in which the mouthpiece is formed by four rollers. These rollers are covered with thick cloth, and are perforated with small round holes; they are also filled with oil. In revolving, the oil is squeezed out and perfectly lubricates the faces of the brick. A still better effect is produced by using uncovered wood rollers, upon which a stream of oil is kept continually flowing; it is, however, difficult to keep such rollers in constant repair even with scrapers attached to them.

The second principle upon which bricks are made by machinery is that in which the clay is delivered into fixed dies removable by hand. These dies are made to take two, four, or six bricks at one time. This is a very imperfect mode of manufacture, and, generally speaking, one in four of the bricks are so bad that they cannot be used.

The third principle of brick machines is exhibited in those in which the clay is delivered from a pug-mill into moulds in which it is pressed by the movement of the machine. The bricks are subsequently raised from the moulds by the continuous action of the machine. The bricks manufactured in this way are more or less perfect, according to the quality of the clay; but they have more or less the fault common to all brick machines, that little or no pressure is exerted upon the face of the brick while it is being delivered from the machine.

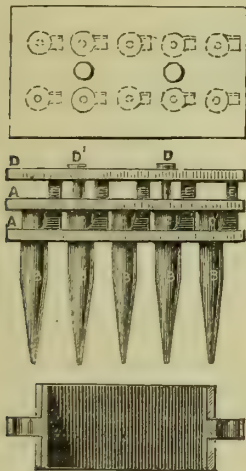
The fourth principle of brick machines is seen in those in which the brick or blank is roughly moulded by the pug-mill, and then finishes by passing it through a roller mouthpiece, or else by introducing the blank so formed and cut off by the pug-mill into the mould of one of Walker's patent brick-presses, such as that described in a former article on Firebricks by the author. This process, although it is somewhat slower than many others, produces, without doubt, the best and most perfect bricks.

The solid brick mould is exactly similar to that previously described for making firebricks, only somewhat smaller. A great improvement in this process would be effected by using the sliding plate before referred to, as the bricks are always slightly damaged in sliding them across the bed of the press. Perforated bricks can be readily made by the same machine with a suitable die. After long consideration, the author decided on making trial at the Beacon-hill Works of a die fitted with ten pins, and to make the pins



of a conical shape, for reasons hereinafter described. The dies were accordingly fitted with ten pins 2in. in diameter at the larger end and  $\frac{1}{2}$ in. at the smaller end. The bricks so made, after the first preliminary experiments, were found to deliver well from the pins, except that a hollow was left round the small end of the hole from the suction, and in drying the brick was very apt to curve when set in the stacks or on the drying-floor on edge in the usual manner. It was supposed, at first, that the suction was occasioned by the burring of the pins from constant wear. Steel ends were screwed into the pins and the pins themselves made  $\frac{1}{2}$ in. larger. This made a slight improvement, but the imperfection remained very nearly the same. The small holes at the bottom of the brick were nearly closed in sliding the brick across the plate, and this was evidently in great measure the cause of the curving in drying, as the upper side of the brick dried so much faster than the lower. It was suggested to the author by many parties that the curving was caused by the brick being more pressed round the large holes than round the smaller ones. A little consideration will show that this was not the case. The pins did not enter into the clay in a close box, but the mould or box rested upon the bed-plate, which was perforated with holes called spout-holes, under the centre of each pin. These holes were made to taper downwards. At the commencement of the action of the press a very small pressure was exerted. When the piston and plate with the pins began to press upon the top of the clay, a very much larger quantity of clay was expelled through the spout-holes, but this was forced by a conical hole through the bottom of the brick, and a considerable pressure was exerted, which was shown by the

FIG. 9

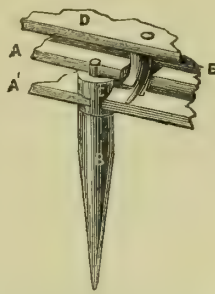


consistency of the clay expelled, and by the fact of its swelling out to the size of the larger diameter of the conical spout-hole. During this time the clay above could not possibly receive any more pressure, as the larger diameter of the pins had already entered the clay, and the pressure subsequently exercised operated solely on the underside of the brick. That such was the case was proved by the subsequent mode adopted for drying the bricks. Instead of being set on edge, they were set flat, with the larger holes uppermost, and as open as possible. By these means the bricks dried perfectly straight, with the exception of the hollow round the smaller holes.

It occurred to the author, after numerous experiments for getting rid of the air, that if the pins could be slightly turned round on entering and leaving the clay, this object would be attained. Such an arrangement was very well carried out by Messrs. Ingram and Stone, of the Dorset Ironworks, by prolonging the pins through the plate, fixing levers to them, and attaching forks fixed at an angle to the piston, which, working

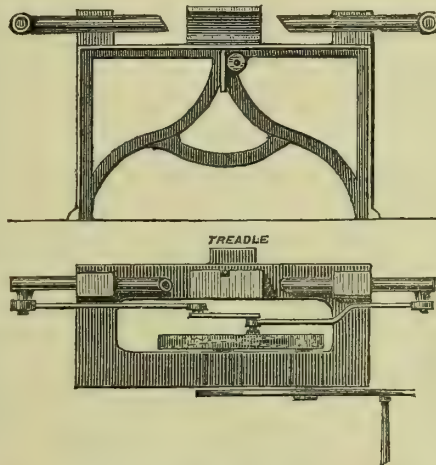
against the sides of the lever, urged the pin backwards and forwards during the rise and fall of the piston. This plan was found to make a very great improvement, and scarcely any hollow was perceptible round the holes. It was proposed to make a still further im-

FIG. 9 A



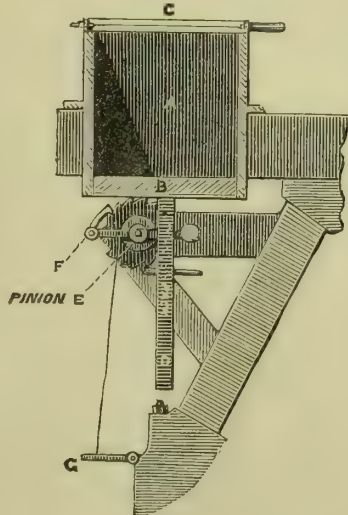
provement by making the pins eccentric or polygonal, with six sides, which in revolving would have left a small air-hole the whole depth of the pins, but this experiment was not tried. The pressed perforated brick was pushed forward by the next blank, and the

FIG. 10



small ends of the perforated holes were partly filled up by the burr round the edges pressing into the holes, while the brick slid across the bed of the press. To obviate this the bricks required to be set upon a sliding-plate, like that mentioned for fire bricks, working in the bed-plate.

FIG. 11



A section of the perforated brick-mould used with Walker's press is shown in Fig. 9, and a detail of the mode of twisting the pins in Fig. 9A.

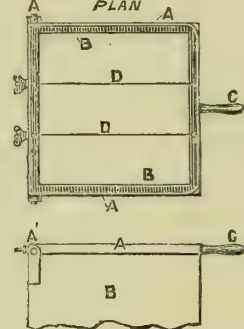
MACHINE FOR MOULDING HOLLOW BLOCKS.

The machine for moulding hollow blocks and wall-facings, of the description above

mentioned, was designed by the author (Fig. 10). It consisted of two parts: the cutting-box and the press. The cutting-box is shown and described in Fig. 11.

The lumps for filling the cutting-box were roughly moulded on the floor of the drying-shed. The frame was made of the requisite depth and divided by wires, fixed on the bottom of the frame, into eight compartments. The pugged clay was beaten into the mould by two men, with heavy rammers, cut off with a wire, and struck with a two-handed strike. On lifting up the mould the lumps were left of the proper size and shape ready to drop into the cutlery-box. It was found a very difficult matter to get the blocks off the boards, owing to their adhering so strongly to the knife for cutting the grooves fixed upon the boards. Various means were tried to remedy this defect, and the plan finally adopted was to fix a cutting knife at the bottom of the press, and to fit a loose plate upon it with a groove in it instead of a wooden board. This plan was found to answer perfectly. Another difficulty arose from the air confined in the clay. It was supposed that this air would have escaped through the hollow plungers when they were drawn together, carrying with it a core of clay, but it was found, after one or two blocks were made, the clay wedged itself so firmly into the plunger that no air could pass, and in drawing back the plunger the block collapsed. Valves of different descriptions were fitted in the plungers to allow the air to escape while the clay was prevented from entering. Some of these valves acted very well for a time, but became gradually clogged with clay. A far simpler expedient was then tried, and found to answer extremely well, a lever was fixed on the outside of the box of the press, fitted with a spring at the back, a handle at one end, a curved arm at the other terminating in a sharp point. When the lever was at rest this

FIG. 12



point, and a portion of the round end of the arm, entered a hole in the side of the press. When the plungers were at the extremity of the forward stroke the lever was pushed forward and let go suddenly; the recoil of the spring gave it sufficient extra motion to enable the point to pass through the clay and to enter a cavity formed to receive it between the ends of the two plungers, which were made solid, and then to spring back again, leaving a small circular air-hole for the escape of the compressed air. This hole was in the bed of the angle block, and therefore of no consequence, and the plan was found to answer perfectly. The above description refers to the Broomhall Company's patent wall-facings. Follett's patent were made in a similar manner, with suitable box to the press, and a larger cutting-box, from which four blanks, or lumps for the press, were delivered at one time. As there were no grooves in these bricks that part of the difficulty was avoided.

Such a machine is adapted for making bricks and blocks of other forms to those above mentioned. Perforated bricks, with two large holes through them, could be made three at a time, the clay being lifted out against a folding wire cutting frame, which could itself be lifted to allow the blocks to be introduced.



Bricks with a pattern upon the face could also be made in a suitable box fixed to this machine, either by a die or dies fixed on the bottom moveable plate, or by an inverted expanding mould, described in the article on Firebricks by the author. The latter process would be the better plan for making layer blocks. They would be divided by a folding frame of cutting wires, as above mentioned, shown in Fig 12.

Of course only two sides could be moulded at one time. Such a machine is adapted to make hollow blocks of any size. If necessary two boxes could be fitted to such press, and two sets of men work at it, the one set of plungers travelling forward while the other was drawing back. Such a machine ought to be worked by an engine, as it would be too heavy for manual labour. The motion might be continuous, as the plungers could never advance too far if properly adjusted. The blocks made by such a machine will be extremely clean and sharp at the arrises, will be equally pressed throughout, and will be thoroughly and equally burned.

### THE HISTORY OF PLAYING CARDS.\*

FEW of us trouble ourselves, in the intervals between the comfortable rubber of whist, or the more noisy round games of cards, and bed-time, about the origin of these innocent-looking pieces of pasteboard, the source of so much harmless amusement to thousands, the unconscious messengers of ruin and misery to many more; and those who have given the matter a second thought, have probably been quite contented with the information usually vouchsafed in cyclopaedias and similar volumes, that cards were invented to amuse a mad king of France by a miniature-painter named Gringonneur. This notion the book before us demonstrates to be an erroneous one. It points out that cards, like chess, are an importation from the East, that their origin is to be sought for in the most remote antiquity, and that to the Gipsies, about the end of the thirteenth century, we owe their introduction into Europe. It must not be imagined that these very ancient cards bore much resemblance to those now in use. They were doubtless employed rather for the fancied interpretation of the will of an unseen deity, than for the amusement of the profane. No specimens of them have come down to us, and we can only form an idea of them from certain emblematic cards of a similar character, the use of which in certain localities is not yet obsolete. These are called *tarot* cards, and are still extant in Switzerland, Germany, Alsace, and Franche Compté. They are unknown, except as curiosities, to the Parisians or ourselves, but they are, nevertheless, the sole representatives of the original cards which the Gipsies brought with them into Europe. A pack of *tarot* cards is composed of seventy-eight cards, viz., the *fou*, or fool, which has no independent value, but increases that of any card which may be combined with it; twenty-one *atouts*, or trumps, having values of their own, and bearing emblems the different combinations of which give a zest to the game of a far more varied and lively nature than is possible with our own picture cards; and, lastly fifty-six cards analogous to those in use among ourselves, though distinguished by different signs. There are forty pip cards—the ace to the ten in four suits—four kings, four queens, four chevaliers or knights, as in chess, and four valets. In a *tarot* pack published at Paris about 1500, we find the following twenty-one emblematic *atouts*. The Bateleur or juggler, the Papess (Pope Joan), the Empress, the Emperor, the Pope, l'Amoureux, the Chariot, Justice, the Hermit, the Wheel of Fortune, Fortitude le Pendu (a man hung by one leg), Death, Temperance, the Devil, the Thunderbolt, the Star, the Moon, the Sun, the Last Judgment, and the World. A wide field of speculation is open to those who would examine fully into the meaning of these emblematic *atouts*, but the results of most inquiries point to the East as their birth-place, and it is, indeed, asserted, that the groundwork of a similar game has been discovered in China, in which, as with the *tarots*, all the parts are based on the number seven (excluding the *fou*,

whose function, it will be remembered, is a passive one), and in which there are in all seventy-seven tablets, inscribed with incomprehensible characters.

Modern India has its cards, and the Hindustani game presents the most striking analogy with the ancient *tarots* of Europe. Their cards or pieces are of oblong or circular shape, in gold and mother-of-pearl, or else painted on pasteboard in gold and colours. They are divided into a certain number of suits—seven or eight—each one being composed of a King, a Vizier, and ten pip cards. Each suit has its distinctive emblem, a sword, a sabre, a small piece of money, an ivory ball, a cabalistic legend or talisman, a pagoda, a small ivory figure, a harp, etc.; and beside them are emblematic figures—*atouts*, in fact—the proper number of which has not been ascertained. At the present day, even, likely as is the pack of our present type to find universal acceptance, the Germans frequently use bells, hearts, leaves, and acorns, to distinguish their suits; the correspondence with the Hindustani cards will be at once noticed. From India these cards were imported by the Gipsies, who entered Europe by the track opened by the Moors and Arabs along the African coast to Tangiers, from whence there would be a ready access to Spain, which country first adopted the new pastime, either about the end of the thirteenth or the beginning of the fourteenth century. Its introduction into Italy was, probably, almost contemporaneous; next it reached Germany, and lastly France. Other nations may, with probability, assert a priority of adoption, but the national genius of the French has so transformed the cards themselves as almost to render them a new institution. The first variation was probably the introduction of queens; and thus began a process of simplification which gradually resulted in the invention of picquet. The marks of suits and the number of cards, as well as the enactment of the fundamental laws of this game, date from the middle of the reign of Charles VII. From this period, little by little, the ancient cards lost their influence; those who, in districts where they still linger, use them, play no longer in the fashion of times past. The Gipsy alone preserves the traditions of the game or science, and she only reveals its secrets in return for the silver that touches her dusky palm. The cards in general use are those of France, and that is her share in the matter, a share with which her people might well have been contented, without claiming the credit of the original invention of the sources from which their forefathers derived their ideas.

The ancient *tarot* card appears never to have been introduced into England. The game probably reached this country from France in the fifteenth century, not from the French people, but from Normandy, Guienne, Saintonge, Touraine, Anjou, and Maine, of which the English kings were the real or nominal masters for nearly 300 years. There does, indeed, exist a pack of cards for which was claimed an English connection, and at the same time an antiquity superior to the French account of their invention and use under Charles VI. These were brought under the notice of the Society of Antiquaries in 1763 by Dr. Stukeley, having been taken from an old edition of Claudian, printed before 1500, for which they had been utilised as covers. The suits consisted of bells, hearts, leaves, and acorns, and a king, knight, and knave made the court cards. There were no queens or aces, and on every deuce was the cardmaker's arms, two crossed mallets, with which Dr. Stukeley supposes they stamped the cards, whereas the French cards of Charles VII.'s time were drawn or coloured by hand, and thence called *tabellæ*, or *pagellæ pictæ*. Besides these, on the deuce of acorns was what he took to be a white hart couchant, the well-known badge of Richard II. The doctor's hypothesis, however, will not stand; first, because paper-making was unknown in this country in the fourteenth century, and next because the marks of the suits refer them unmistakably to the German type. Besides, if all his conclusions were correct, the comparative antiquity of the cards would not be advanced, seeing that the imbecility of Charles VI. of France and the era of our Richard II. were coincident. We have, however, documentary proof that cards were in use in this country some time previous to 1463, for in that year we find their importation forbidden by an act of Parliament, together with "dycs and tenys balls."

It is an acknowledged fact that the German cardmakers were the earliest wood-engravers in Europe, and, therefore, an additional interest

attaches to the remaining examples of their art. Their original marks of suits were *Schellen*, grelots or hawk-bells; *Roth*, red, or *Herzen*, hearts; *Grün*, green (leaves); and *Echlen*, acorns; supposed respectively to denote the nobility, the clergy, the gentry, and the labourers. The application of the last emblem is not very clear, but that of the others is thoroughly German in character. Even at this early period the printed cards were coloured; there was no attempt at shading, or where any existed it was merely a series of lines as strong as those which formed the outline. The city of Ulm was the centre of the card manufacture, and the Suabian cards had for a long time, fifty years at least, a considerable run. This was in the first half of the fifteenth century. Italy furnished the grand outlet for this manufacture of Ulm, as at a later period she accepted with equal readiness the more modern cards of France. Very rare are the examples from which we may derive any idea of the character of these early painted and engraved cards; and but little reliance can be placed on the costume of the figures on them to determine their date. Certain types, as soon as they became conventional, appear, as in our own day, to have continued in circulation for considerable periods, and it will be readily seen that a New Zealand antiquary attempting five hundred years hence to determine the date of a nineteenth-century pack of English cards from the costume of the King of Hearts, would possibly be more disposed to ascribe it to the time of Henry VIII. than to our own, when men go more soberly arrayed. The discovery and successful accomplishment of card engraving, once an accomplished fact, artists appear to have given free play to their fancy. The main principles of the *tarot* pack remained the same, but in place of bells, leaves, hearts, and acorns, came a succession of novelties—figures of men, animals, birds and flowers, each in its turn being superseded by some other. One very beautiful pack exists in the Paris Library. The engraver's name is unknown, but they are believed to be the work of the German artist usually called by collectors—the "Master of 1466." A peculiarity in their execution, pointed out by M. Duchesne, is that several copper-plates seem to have been used to print them,—the five of flowers, for instance, requiring as many pieces of irregular form, which were fixed evenly in a matrix, and the impression then taken off in the usual way. A collection of 29 other cards also exists in the same library, apparently forming part of a pack of 52 pieces, each of the four suits, human beings, bears, and lions, deer, and birds, containing four coat and nine numeral cards. These cards are of extraordinary size, being 5½ in. long, by 3½ in. in breadth. There is a very curious pack of cards of a circular shape of rather a later date, several of which are engraved in Strutt's "Sports and Pastimes." The suits, five in number, are hares, parrots, pink roses, and columbines. There are four picture cards to each suit: king, queen, and, as is usual on some German cards, two *lanzknechte* or knaves. These cards have been ascribed to Martin Schön, or Schöngauer, but it is believed, erroneously. Mr. Singer supposes the original pack to have consisted of seventy cards; the increased number of suits being indicative of their Oriental derivation. Certain it is also that the circular shape is Eastern, and symbolic of Pantheism. Europe has uniformly adopted the square shape in her cards. We must say a word about the beautiful Florentine engravings, known to the Paris dealers as *Cartes de Baldini*, and which have been attributed to Andrea Mantegna. Of these there are two series, one being supposed to be a copy of the other; the best executed specimens are probably the earliest. There is a complete set in our own National Library, and another in the Bibliothèque Impériale, for which was given in 1820, 2,000 francs! This pack is composed of fifty pieces: a Beggar, a Valet, a Goldsmith, a Merchant, a Gentleman, a Knight, the Doge, a King, an Emperor, the Pope, Calliope, Urania, Terpsichore, Erato, Polyhymnia, Thalia, Melpomene, Euterpe, Clio, Apollo, Grammar, Logic, Rhetoric, Geometry, Arithmetic, Music, Poetry, Philosophy, Astrology, Theology, Astronomy, Chronology, Cosmology, Temperance, Prudence, Fortitude, Justice, Charity, Hope, Faith, the Moon, Mercury, Venus, the Sun, Mars, Jupiter, the Eighth Sphere, the Chief Agent, and the First Cause. We are here a long way removed from the symbolic figures of the ancient *tarot*. The Eighth Sphere and the First Cause are certainly something new in a game of cards! The delicacy

\* "The History of Playing Cards." London: Chatto and Windus.



of their execution is no less remarkable than the strangeness of their designs. M. Duchesne guesses, indeed, apparently with very little reason, that they may be a unique specimen of the primitive type of a pack of cards—the ancient *tarot* in all its simplicity. “In the pack is shown,” says he, “five classes; the different grades of society, from No. 1 to 10; the Muses and Apollo from 11 to 20; the Sciences from 21 to 30; the Virtues from 31 to 40; and the Planets from 41 to 50.” Into the history of the more recent specimens of the *tarot*, we cannot here stay to enter; from the moment of the invention of the French game, the elder variety, losing its pre-eminence, became the sport of fancy. It exists—but altered in every possible way, and is constantly losing ground; the French game, on the contrary, has continually attained an increasing degree of success.

In the French cards, subsequently generally adopted in other countries, occur four suits, each composed of three figured cards, king, queen, and valet, a knave, and a number of pip cards, which varies, but is never less than five or more than ten. The custom of giving names to the figured cards is peculiar to France; those anciently conferred were: on the King of Hearts, Charles or Charlemagne; the Queen, Judith; the Knave, Lahire; the King of Diamonds, Cæsar; the Queen, Rachel; the Knave, Hector; the King of Clubs, Alexander; the Queen, Argine; the Knave, Lancelot; the King of Spades, David; the Queen, Pallas; and the Knave, Hogier. Though not uniformly observed, the above have been re-imposed in modern times. The four kings are supposed to represent the four ancient monarchies of the Jews, Greeks, Romans, and Franks; and the queens, Wisdom, Birth, Beauty, and Fortitude. In some packs Esther, as an impersonation of piety, is substituted for Rachel. From and during the sixteenth century a good deal of the history of the times may be read on the cards. In a pack of the time of Henry IV. (1589-1610) in the Bibliothèque Impériale which bear the initials of Vincent Goyrand, all the Court cards are habited in the costume of the period. The Kings are Solomon, Augustus, Clovis, and Constantine; and the Queens, Dido, Elizabeth (Henry's ally), Clotilda, and Pentesilea. A modernised costume appears about this time to have been also adopted on the English cards, for in Rowlands' “More Knaves Yet,” published after his “Knave of Hearts,” we find the Knaves of Spades and Diamonds thanking their printer for their new “Bootes and stockings,” “Garters, Polonia heels, and rose shoe strings.” In France in the seventeenth century, during the reign of Louis XIII., further alterations were introduced, and in a more marked degree under Louis XIV. August personages of ancient history began to reappear, but in costumes of an entirely novel description. In the earlier packs the queens are habited in the fashion of Marie de Medicis. At a later period we find them in the dress of Madame de Montespan, the violent and variable mistress of Louis XIV. Passing events now appear to have prompted all manner of vagaries. The record of a victory—the capture of Charleroi, for instance, reaches the capital, and at once some enterprising cartier produces a patriotic commemoration in the shape of a pack of cards. As a specimen, in one pack a four of spades bears as many cannon furiously bombarding a fortress; in another, hearts are replaced by trumpets and drums, the diamonds by flowers, clubs by the lilies of France, and the spades by standards and helmets. The famous embassy of the pretended King of Siam in 1686, a mystification politely contrived by the courtiers of Louis XIV. to feed his vanity, has left its traces in the history of cards, for a pack exists signed *G. D., à Paris, rue de l'Arbre sec*, adorned with the portraiture of the King of Siam.

In England by 1629, the trade of card-making seems to have attained sufficient importance for the establishment of a company, which was accordingly incorporated by Charles I., but two years later that needy monarch created a monopoly of playing-cards, bought all the rights of the company, and sold them again at a much higher price, thus probably greatly lessening their advantages as compared with the foreign cards. The importation of the latter was altogether forbidden in 1643, on the petition of several poor card-makers “likely to perish.” During the Civil War men's minds turned to a sterner game, sufficiently described in a pamphlet of the time, “The Bloody Came at Cards, as it was played by the King of Hearts and the rest of his suite

against the residue of the pack, shuffled at London, cut at Westminster, dealt at Yorke, and played in the open field.” The Roundheads, of course, eschewed such carnal vanities, and with their characteristic hypocrisy, introduced various descriptions of “Sciential cards,” which, ostensibly devoted to the advancement of learning, yet enabled the time-server to enjoy a taste of his old amusement while keeping up appearances. Charles II., of course, reintroduced card-playing to some tune, the more sober-minded among his people endeavouring to arrest the profligacy which the example of the Court was spreading through the land by the introduction of Historical, Geographical, Heraldic, and other instructional cards, to which the people took about as kindly as do our children to some of the marvellously-combined games of information and amusement contrived by modern puzzle-makers. Sir Joseph Banks exhibited to the Society of Antiquaries in 1733 a pack containing a complete history of the attempted Spanish Invasion, and in the *Journal of the Archaeological Association* for 1853-54, is a full and illustrated account by Mr. Pettigrew of another, satirising the members of the Rump Parliament and other individuals conspicuous during the Commonwealth.

The Revolution in France upset Royalty, and with it the cards of the *ancien régime*. Two master cardmakers declared that no card-playing Republican could possibly make use of such expressions as kings, queens, &c.; so they transmogrified the kings into Genii—the genius of Cœur, or of war; of Trefle, or of peace; of pique, or of arts; of carreau, or of commerce; the queens became Liberties; the knaves, Equalities; and the aces, Laws. Others tried the substitution of Sages for kings, Virtues for queens, and Braves for knaves, but somehow the people never took kindly to Cato the elder, Solon, or Horatius Cœles in connection with piquet. With the First Empire came other changes, and a novelty in the colouring of these cards is also observable, carmine and rose predominating, to the exclusion of the old red tint. On the Restoration the ancient cards at once regained the supremacy which they still hold, both here and in France, in spite of many efforts to deprive them of it. The conventional types still maintain their popularity, and, indeed, in some respects, are ruder in design than many of the earlier examples.

Our modern English manufacturers, De La Rue, Hunt, and others whose cards are used in all civilised countries, have entirely devoted their attention to improvements in the manufacture of the cards and the execution of the designs. In this they have succeeded so admirably as to make one wish some effort had been made at improvement in the designs themselves. Perhaps, after all, the attempt would be as futile as past failures, though the successful introduction of such games as Bezique and Zetema seem to point to a contrary conclusion. In the latter game, by the way, Messrs. Hunt seem to have embodied some of the features of the ancient *tarot*, to what extent we do not know, being ignorant of the rules of the game.

We have not half exhausted Messrs. Chatto and Windus's book, and all, who by our imperfect notice have become interested in the subject, which they may have previously thought a comparatively barren one, should read it for themselves. The second part is devoted to a dissertation on the various games of cards, with anecdotes of famous players, and a most amusing frontispiece reproduces two caricature cards from a pack formerly in the possession of the Count D'Orsay.

#### THE BISHOP OF MANCHESTER ON CHURCH-BUILDING.

ON Monday the foundation-stone of a new church which is to be dedicated to St. Chrysostom was laid at Birch-in-Rusholme, Manchester. The church will be in the Early English style of architecture. The external walls will be of Yorkshire stone, with Darley Dale dressings, while the interior will be lined with red brick and finished with Hollington stone. The plan consists of a nave and side-aisles, a choir, a chapel or transept on the south-east, and a vestry in two floors for choristers and clergy. The whole of the congregation will be seated within the nave, the aisles being used only as passage-ways. The extreme length internally will be 124ft., and the width 47ft. Mr. Redmayne, of Manchester, is the architect, and Mr. Mark Foggett, of Cheetham Hill, the contractor.

The Bishop of Manchester, who was present, said he had asked what was to be the cost of the church, and he had been told that before the idea was completed, and the church was furnished and fitted with its tower or spire, the total cost would be £12,000. At the present time only £6,000 had been raised, and therefore the committee had a work of some magnitude before them to raise the balance of the money required. The cost of church-building had very much increased during the last twenty-five years. It was once thought that they could build a church substantially and in conformity with the true principles of architecture at about the rate of £10 per sitting; but now he found that Board schools cost £14 per child, and that church, when it was completed, would have cost about £20 per sitting. He only hoped that the committee had secured the services of a contractor upon whom they could depend, for it grieved him to hear, as he did continually, of the shameful way in which churches particularly got “scamped” nowadays. He only heard the previous day of a church which he had consecrated, and which was built at a cost of about £13,000, and was to seat 700 persons, that the roof would have to be stripped immediately because the slates were worth nothing, and yet he was sure the best price was paid for them. He did not know what the building trade was coming to. He heard the same complaints everywhere, and he thought it concerned the members of the trade, for their own credit's sake, to look to the matter, and to let no “scamped” work of any kind go into buildings either secular or ecclesiastical which were honestly and liberally paid for. If he was prepared to take a “scamp” contract at a “scamp” price, he had no right to expect first-class work, but if he was prepared to pay a liberal price for good work he expected what he was prepared to pay for. He hoped that church would be a monument to which the contractor and the architect—for he believed that architects were sometimes to blame as well as builders—could point and say, “If you want to know what sort of work I can do, go and see St. Chrysostom's Church.”

#### BOOKS RECEIVED.

*Sewage No Value: The Sewage Difficulty Exploded*, by EDWARD MONSON, A.I.C.E. (London: E. & F. N. Spon), is a reprint of a recent paper read before the Municipal and Sanitary Engineers' Association, at Birmingham. The author disbelieves in the value of sewage as a manure. He believes that where it can be utilised by gravitation it may pay its expenses, and that the attention of town authorities should be directed to its purification by filtration and by utilisation to a limited extent, which requires less land and does not entail so much expense.—*Tables for Screw Cutting*, by H. L. (London: E. & F. N. Spon), will save many devotees of the lathe much time. The whole of the screws which ordinary wheel-work will cut with a 20-pinion wheel will be found arranged in terms in the order of the screws, and not, as in Morton's tables, in the order of the wheel work. Thus at a glance it is possible to see what pitches can be cut, instead of having to work through some ten pages to see whether the exact pitch required exists.—*Improved Fireplaces*, by Messrs. EDWARDS & SON (London: Longmans and Co.), is an illustrated pamphlet in which are described some of the authors' designs for improved fireplaces submitted to the Society of Arts in response to the appeal lately made by the Council of that Institution. Messrs. Edwards and Son are well-known by their previously published works on Domestic Fireplaces and other cognate subjects, and anything they have to say on the important subject of fuel economy will be welcomed by our readers. A number of valuable suggestions appear in the pamphlet; more are promised in a future edition.—*A Microscopical Examination of Certain Waters*, by JABEZ HOGG, Surgeon, &c., &c.; and a *Chemical Analysis*, by DUGALD CAMPBELL, with introductory notes by SAMUEL COLLETT HOMERSHAM (London: W. Trowne), will be of interest to all interested in the question of pure water supply.

A new fish-market is contemplated at Plymouth. Mr. Birch, of the British Museum, has lately been residing at Alnwick Castle, translating, arranging, and cataloguing the rare and valuable Egyptian antiquities which Algernon, Duke of Northumberland, when Lord Prudhoe, collected during his travels in the East.



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## ILLUSTRATIONS.

HOUSE AT COLLEARN, PERTHSHIRE—CHURCH OF ST. COMGHALL, STRABANE—DETAILS OF CHURCHES IN THE SOUTH OF FRANCE.

## OUR LITHOGRAPHIC ILLUSTRATIONS.

## CHURCHES IN THE SOUTH OF FRANCE.

WE give several illustrations taken from some churches in the South of France, which are not less interesting than those of the North. The pure Romanesque style may be studied in gates, porches, towers, altars, sculptures, and mural ornamentations. One of the finest porches is that of the Church of St. Martha, at Tarascon (Bouches du Rhône), though little more than the mere decorative outlines has been left by the levellers of 1793. The political iconoclasts destroyed the rich pages of Christian iconography illustrating the life of St. Martha. The Tympanum formerly contained Christ enthroned, and surrounded by the four Evangelists, represented by their four symbolic signs; now the place is empty, marked by semicircular mouldings of great sharpness and simplicity. Under the tympanum was Christ's triumphal Entry into Jerusalem in a powerful relief; now the bare architrave is left. On one side of the entrance the Resurrection of Lazarus was represented, and on the opposite side the Victory of St. Martha over the Dragon; between the columns on the one side were Jews witnessing the miracle, and on the other armed inhabitants of the town were placed, all in symmetrical arrangement. The date of the canonisation of the saint, 1187, appears to have been that of the construction of the gate. The centre column dividing the entrance is probably a later addition, the capital being in a style entirely different to that of the side-columns. The corbels are unsymmetrically ornamented with eagles' and rams' heads, but the cornice has some admirable details in scrollwork; the composition is full of Greek and Roman elements.

Towers and belfries during the Carolingian period were generally square, though some were octagonal, as that of Notre Dame des Aliscamps près Arles, the ground-plan and elevation of which we give. Some of these belfries were raised in front above the principal entry, or as in the one just mentioned, the tower rose above the apsis. Another square tower, which we give, stands in the cemetery of a village in the département de l'Hérault, known under the name de Puissalicon. It reminds us in its details of the spires constructed on the borders of the Rhine. The architectural details are taken from fortified watchtowers. The capitals of the columns, the mouldings in different alternating colours, give a peculiar effect to the building, and are in a picturesque style. The octagonal tower of the Church of Notre Dame des Aliscamps is provided with a cupola which is rather too small, and therefore produces a heavy effect. The arcades are entirely Roman; the capitals of the first and second story differ in their details, forming in the use of the Acanthus leaf a transition from Byzantine into Early Gothic.

The private buildings of this period were heavy and compressed. As an example we give the "Maison à St. Gilles," constructed on the same principle as the Romanesque churches, provided with small windows, huge walls, and heavy subdivisions. The mouldings of the outer walls are of great excellence, as may be seen in the details which we give; the diaper ornamentation of the first-floor is simple, sharp, but not symmetrical, the upper row differing from the lower, and breaking the pattern without reason. The trefoils above the square windows, as also the capitals of the mullions, appear to be later additions, bearing clearly elements of the Gothic style. The decorative part of the abacus is

extremely fine, whilst the elongated bell is out of shape, and the ornamental element a superfluous instance of the artist's bad taste. The house is highly interesting from a historical point of view, as it belonged to the family of Pope Clement IV., who is said to have been born in it. We may assume from its architectural details that it was constructed during the twelfth century. The central entrance and the two narrow apertures, are surmounted by a heavy lintel, above which arches are marked, which give a very incongruous aspect to the doors. The inner arrangement of the house has so often been changed that it is impossible to draw conclusions with regard to the disposition of the rooms. The governments of France deserve great praise for the care they bestow on old monuments; they have intrusted a special commission with the preservation of old historical remains, and ordered their publication in a masterly illustrated work.

## COLLEARN, PERTHSHIRE.

This house, of which we give perspective view and plans, is the residence of Mr. Alexander Mackintosh, and was completed two years ago. The style adopted is that of many old houses of the neighbourhood, which are often exceedingly picturesque, and still habitable. The walls and ceilings are panelled with wood; the windows are to a large extent filled with painted glass, by Messrs. Cottier and Messrs. Heaton, Butler, and Bayne, and the general fittings and furnishings, in some cases, have been designed in accordance with the house. A library, with vaulted ceiling, and a suite of rooms occupy the upper part of the house, from the windows of which a magnificent view is obtained. The principal works have been carried out by local contractors. Mr. William Leiper is the architect.

## NEW CHURCH OF ST. COMGHALL, STRABANE.

We are requested by Mr. John Kennedy, the architect of the above church, which is about to be erected at Strabane, Ireland, to postpone our description of the building till next week.

## NOTES IN THE STREET.—III.

FEW parts of London have undergone such a rapid transformation as that portion lying between Smithfield and Ludgate-hill; and few now living, who can remember the days of the last century's closing decade, would find any resemblance between the locality as it presented itself when the Gordon Riots devastated the neighbourhood and its present appearance. The construction of Holborn Viaduct, the clearance of several acres of land on the south side of the Smithfield Market, and the raising of stately structures in the immediate vicinity, have invested the locality with a very different air to that which existed only a few years ago. Many associations cling round this spot, and a few marks of the past yet linger. There is the church of Wren, "Christ Church," built upon the site of a priory of the Grey Franciscan or "Preaching Friars," founded by Henry VIII., with its old Classic interior and wagon-shaped ceiling, overlaid with scrolls and cherubins; its picturesque tower in Wren's semi-Classic taste; while in Warwick-lane we have the same architect's College of Physicians, where Harvey lectured to students upon the circulation of the blood, and which is a veritable example of the Queen Anne style. The names of the authors of "Pilgrim's Progress," Baxter, Dobson the painter, Archbishop Leighton, Dr. Johnson, and several other celebrities, are associated with the localities of Warwick-lane and Snow-hill. Dr. Johnson established a club for literary dis-

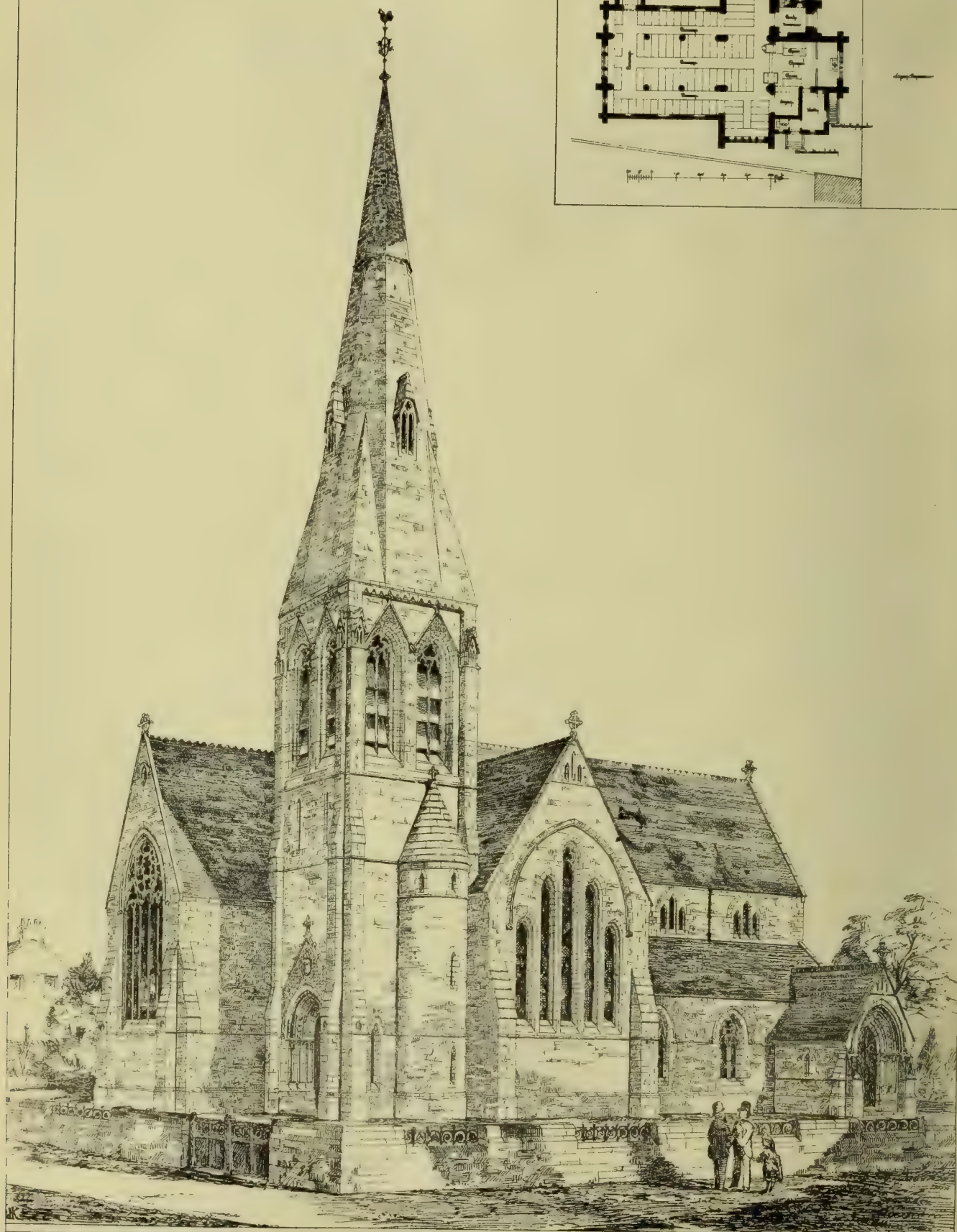
cussion at the "King's Head," Ivy-lane, while Warwick-lane owes its name to the Earl of Warwick, who built a house there, since which the tide of aristocratic life has flowed westwards.

We may notice a few of the new faces these localities wear. Architecturally there are left but few vestiges. Grim Newgate Prison, and one or two other buildings already noticed, remain as landmarks of the old neighbourhood, rendered more striking in their contrast to the palatial-looking buildings which here and there mark the strides of modern enterprise and commerce. The Chatham and Dover Railway, with its extensions and stations, cut in twain the old haunts of this once dense locality, and appear to invite the speculative spirit of the merchant and tradesman. Viewed from Holborn Viaduct, the extensive areas and gaps south of Smithfield form a vast plateau of debris and building operations highly suggestive of progress, and we could wish that the rebuilding of such a fine area will be duly appreciated and judiciously planned. Unfortunately, however, such opportunities are too often left to the mercies of mercenary leaseholders, and no inducement is held out to any radical reform in the laying out of thoroughfares. One or two recent buildings conspicuously presage improvement upon the older class of structures. One of these is the "Saracen's Head," a commanding-looking front in red and white bricks and stone dressings; and it presents a somewhat strange contrast to its precursor of that name, a well-known hostelry akin to "King's Head." By a curious coincidence, indeed, the style of the new building recalls the olden time, when the neighbourhood was a resort of a host of departed notabilities, *literati* and physicians. The old "Saracen's Head" was a building of genuine Queen Anne's date; the new one is at least an improved imitation. This building stands between the well-known Cock-lane (rendered celebrated as the scene of the "Cock-lane ghast" an imposture which, equally with our modern imitation mediums and *séances* created an excitement for many years) and King-street, and faces Snow-hill. The front is on a slight curve. The architect, while giving us a sensible-looking building, has shown that the style which he has adopted admits of dissimilar modes of treatment—one characteristic of oddities and freaks, the other of a common-sense regard to our improvements in the manufacture of bricks, glass, and modern joinery. We here have all the characteristics of the style without those peculiarities which belonged simply to a period of imperfect appliances, but which some modern imitators like to see reproduced also from picturesque or sentimental motives simply. The curb roof is relieved by large dormer fronts over the three main divisions of the façade, but without any of those crimped ornaments, broken entablatures, and pediments, which display eccentricities only. The treatment of the façade itself is very satisfactory. It is broken up into parts by slight breaks, which form the centre and wings, and the accentuation is made more distinct by the use of white brick in coupled angle-pilasters and entablatures, which offer a more pleasing contrast to the red brick of the retiring portions than if all had been of a dull heavy red. The treatment of the windows, while it is essentially characteristic of the style adopted, is not a ridiculous parody of ancient leaded or thick-barred lights. The effect of the old flush window frames is obtained by the use of stone mullions and transoms in the principal windows, the angles being taken off by a slight round. Contrasted with the upper brick mullions which continue the fenestral division, they have a light yet good effect. The main entablature or cornice, and the horizontally-marked divisions of the front, are of white moulded Suffolk and stone, and combine happily with the other parts. All the principal windows have transomed heads, which enable the architect to use large, lofty windows, without appearing to sacrifice a substantial effect. The doorway is of stone jambs, supporting a circular pediment, which is boldly projected on carved trusses, and boldly carved in the tympanum.









NEW CHURCH OF S. COMGHALL, STRABANE, IRELAND.

John Kennedy Architect.





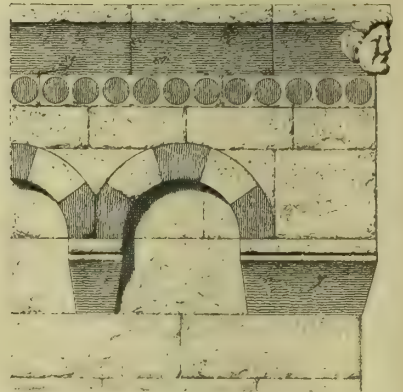




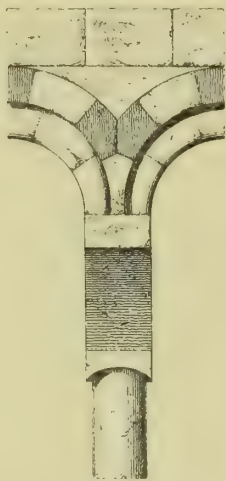
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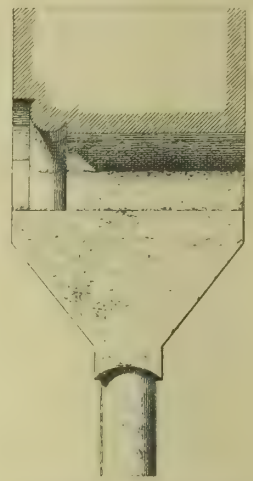
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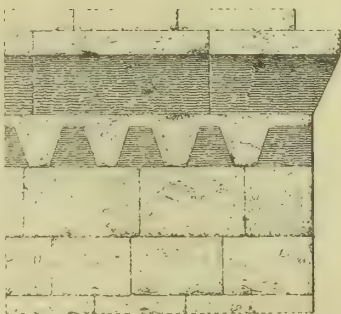
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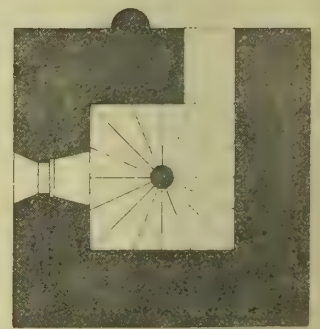
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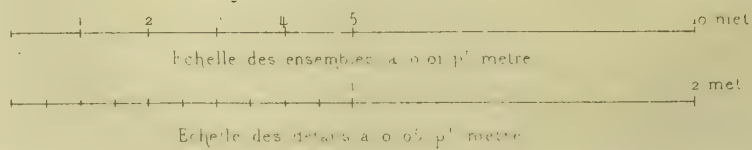
COLONNE LE PROFIL



CORDON DU 1<sup>er</sup> ETAGE



P.L.A.



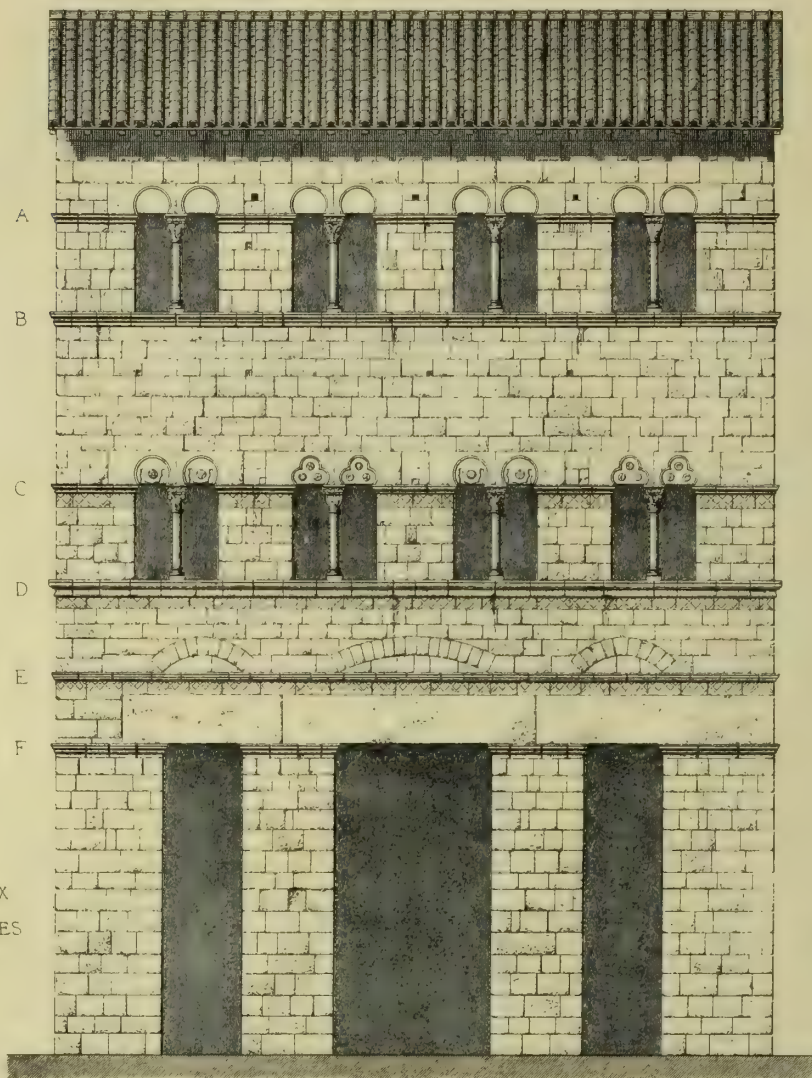
CLOCHER DIT TOUR DE PUISALICON

(HERAULT)









PROFILS DES BANDEAUX  
ET AU-DESSUS DES FENETRES

AU 10<sup>e</sup>

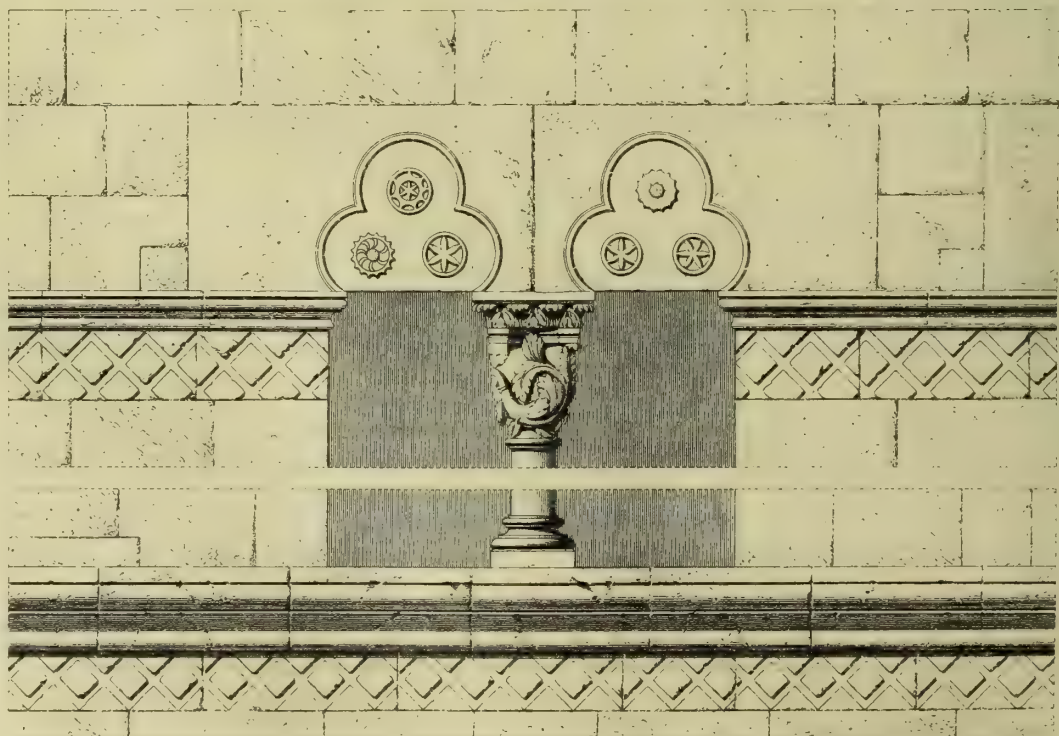
PROFILS DES BANDEAUX  
ET AU-DESSUS DES FENETRES

AU 10<sup>e</sup>

ELEVATION



PLAN



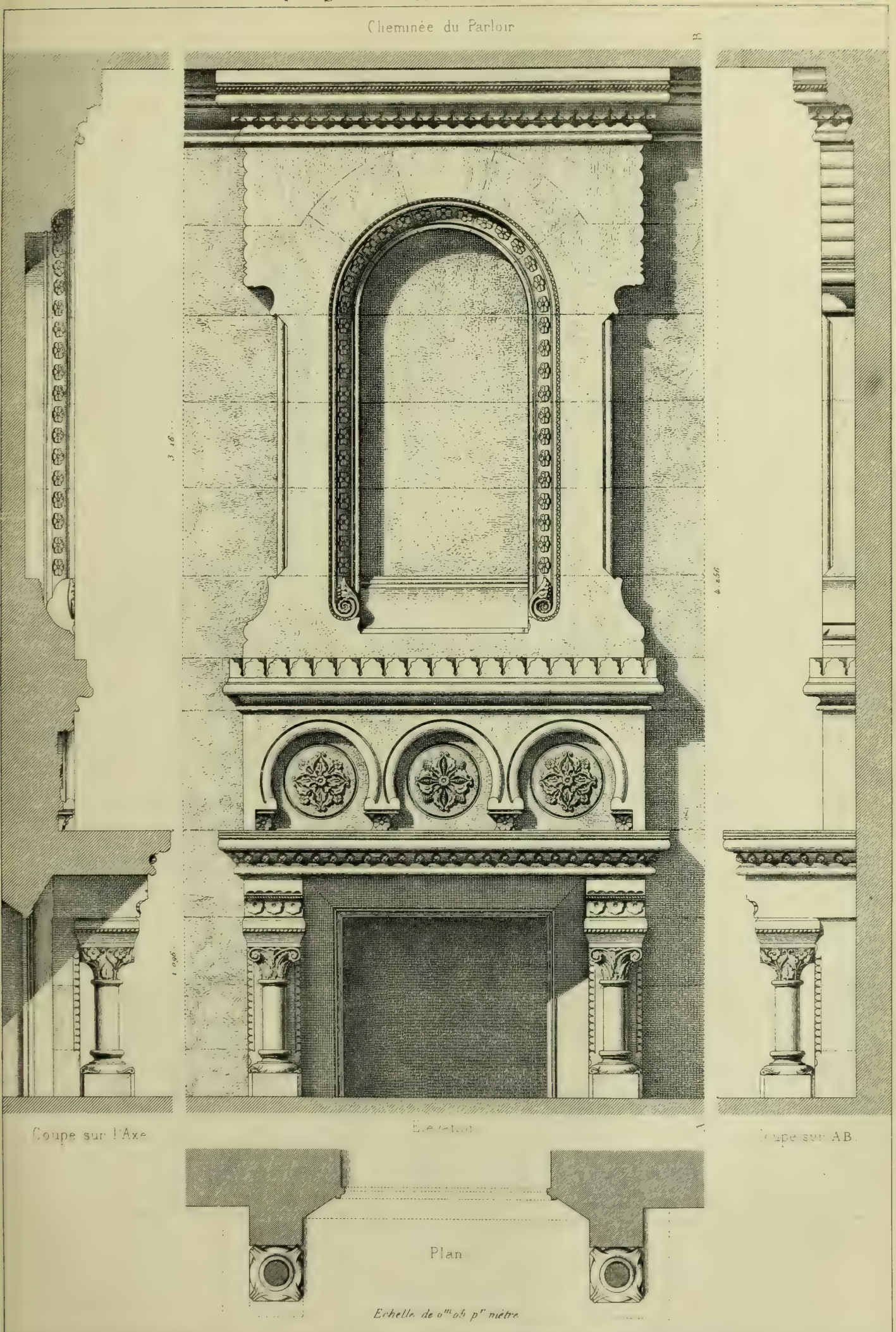
DETAILS DU 1<sup>er</sup> ETAGE

Echelle du Plan et Elevation  
1 2 3 4 5 m.

Echelle du Detail  
5c . metre



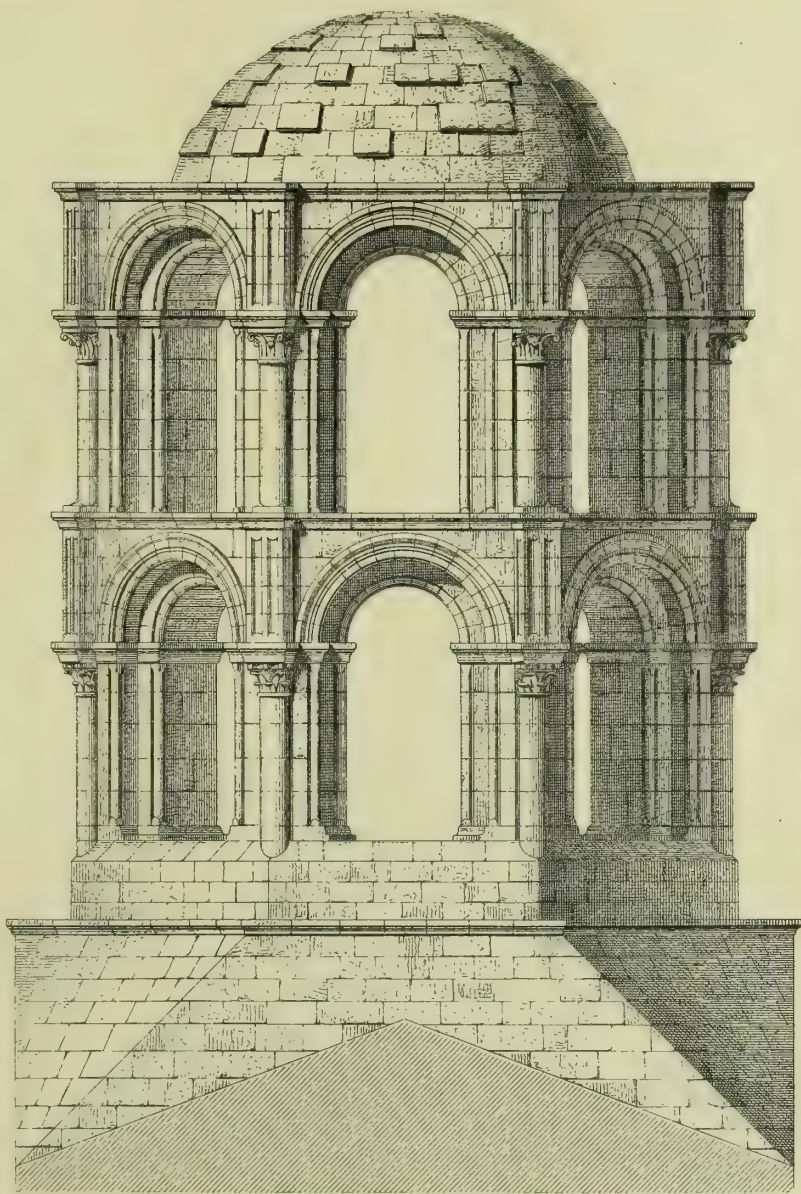
Cheminée du Parloir







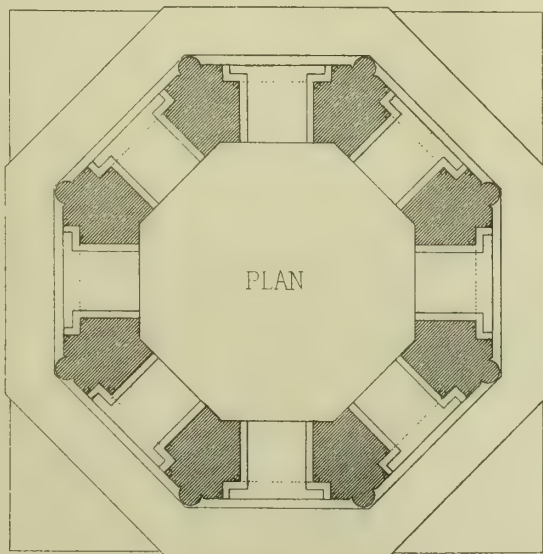




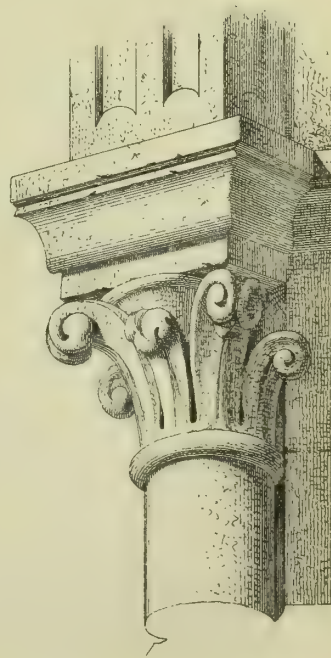
ELEVATION DU CLOCHER



CHAPITEAU DU 1<sup>er</sup> ETAGE



Echelle du Plan 1 2 3 4 5 6 metres



CHAPITEAU DU 2<sup>e</sup> ETAGE

Echelle de l'Elevation 1 2 3 4 metres

NOTRE DAME DES ALISCAMPS PRES ARLES

(BOUCHES DU RHONE)

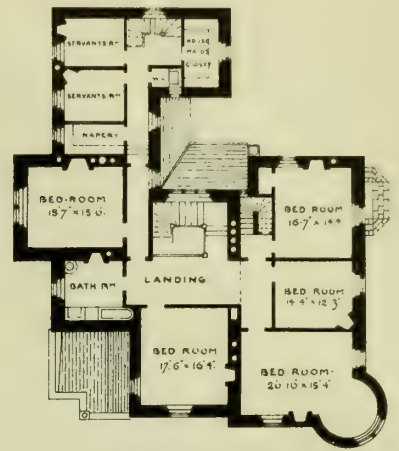




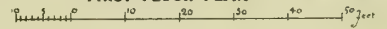




PRINCIPAL FLOOR PLAN



FIRST FLOOR PLAN



HOUSE ERECTED AT COLEARN, PERTHSHIRE, FOR ALEXANDER MACKINTOSH ESQ<sup>RE</sup>  
WILLIAM LEIPER, ARCHITECT.







## THE NEW GUILDHALL, PLYMOUTH.

At the last meeting of the Plymouth Town Council, the Town Clerk read the report of the New Guildhall Committee, stating that they had received from the architects (Messrs Norman and Hine) a final statement of the contractor's account for the erection of the new Guildhall and Municipal Offices, certified as approved, showing the liabilities incurred, after taking credit for sundry works contracted for, but not executed, as amounting to £43,833. 9s. 11d. In this account were included the original and supplementary contracts, and the additional works sanctioned at different times by the Council, amounting in the whole to £38,033. 9s. 6d., leaving £5,800. 0s. 5d. as the cost of numerous additions and improvements in various portions of the buildings. In the account thus certified are not included the excavations and different works in the central area, and at the western end of the municipal offices, which have been executed at a cost of £2,678. 9s., to which must be added the sum expended on fittings and furniture (£2,273. 11s. 11d.), which, with the incidental expenses of furnishing bills of particulars, the salary of the clerk of the works, and the payments made to the architects (whose account requires to be adjusted), amounting to £3,109. 6s. 6d., brings up the total outlay to the present time to £51,894. 17s. 4d. The architects' report detailing the various "extras" and alterations was also read, Messrs. Norman and Hine's concluding remarks being as follows: "The extras and deductions have been ascertained on the basis of the contract, and valued in accordance with the schedule of prices forming part of that contract, the various items having been settled by us, after careful checking of the measurements and calculations. Many claims submitted to us by the contractor have been struck out, although it is only fair to him to say that he has not insisted on them, in any case where we have shown that the works involved in them were contemplated by the original drawings and specifications. Variations have from time to time appeared to us absolutely necessary for the perfect strength and security more than for the ornamentation of the structure. We submit that such variations are incidental to all large and elaborate works of this kind, involving varied and difficult construction, and that similar buildings erected in this country show a far greater proportion of extra cost. Most of the variations are, singly, of small account, and they have occurred during the progress of the buildings, when it would have been difficult to have ascertained the cost previous to execution without seriously delaying the work in hand. In consequence of the precautions taken, these lofty buildings have stood the test of the severest weather, and, notwithstanding that the foundations are unequal, in some places on the natural rock, in other places on concrete laid on made ground, there are nowhere any settlements sufficient to cause the slightest crack in any portion of the buildings. With regard to the carving and decoration accounts, we believe the whole of the ornamental work has been done at unremunerative prices. In conclusion, we must point to the building itself, and the many hundreds of drawings relating to it, prepared by us during the past six years, as some proof that we have not been unmindful of our obligations and duty to the Corporation and town of Plymouth, and we ask the Committee and Council to take into their consideration the arduous and difficult task which has devolved upon us, not so apparent at the beginning as during the progress of the work, of producing a building admitted to be one of the most important municipal structures in the kingdom, for a sum relatively small to the cost of other modern townhalls, and inadequate still, we freely admit, to the complete realisation of our wishes respecting it." The report of the Committee was unanimously adopted, on the motion of the Mayor, seconded by Mr. Hubbard, who remarked that the extras amounted to about 15 per cent. on the amount of the contract; but what had they got for it? They had oak doors instead of deal, they had under the arcades brick instead of plaster, etc., etc. He would say, without fear of contradiction, that there was not another such hall in England that had cost so little money as this one; there was not one covering so large an area of ground that had been built for less than £100,000.

These remarks of Mr. Hubbard, taken in conjunction with the concluding portion of the architects' report, would seem to afford some slight ground for the statements which have been made in the *Western Daily Mercury* to the effect that

the good people of Plymouth have got too much for their money, presuming all the workmanship and materials to be of the best quality. The newspaper referred to has done more than draw such inferences; it has boldly asserted that the roof has been "scamped," and it still maintains its assertions to be well founded, and challenges the Town Council to engage a competent man or number of men, without local prejudice, to report on the work. On the other hand, Mr. Hicks, one of the Town Councillors, after denouncing the *critique* in the *Mercury* as "scurrilous," said he "wondered how it was that any person could be so weak as to condemn either the size of the timbering in the roof, or the manner in which the whole work was carried out. He took the dimensions of some of the timbering in the roof, and he found that the tie-beams were 12in. by 12in., the king-post, 12in. by 12in., and the principals 14in. by 6in., and 12ft. 8in. apart. The roof, he should think, was as nearly two sides of a triangle as it possibly could be, and, looking at its dimensions, he considered that 14in. by 6in. was a very large size for the principals. The lower collar-beam was 12in. by 6in., and the upper one 9in. by 5in.; there was a 2in. iron king-head, very strong, and a king-bolt 44ft. long, with all the collars well strapped with heavy iron; the rafters were 3in. by 2in., with a bearing of 4ft. 6in. only, and the ranging-piece was 9in. by 6in."

## THE INTERNATIONAL CONGRESS OF ORIENTALISTS.

THE Archaeological section of the above Congress held its meeting on Friday last, in the theatre of the Royal Institution, Albermarle-street. Mr. Grant Duff, M.P., delivered the inaugural address. He said:—The section which meets to-day deals with no narrower a subject than the art, architecture, and archaeology of all Eastern countries. A paper on the Mosque of St. Sophia, a paper on the Temples of Kioto, a description of the jewelry of Vizianagram and of the Palace of Khiva would quite legitimately belong to it. The range of possible topics being thus so enormous, anything like a general introduction to the subject before us would be absurd. A far less ambitious attempt is likely to be more useful, and so I propose to devote most of the time at my disposal to mentioning certain facts which are likely to be new to some of my hearers with reference to the recent progress of archaeology in India. I am rather led to take this course because the only reason which could possibly induce those who organised this meeting to ask me to preside over our deliberations to-day is that, although I have never had an opportunity of giving much attention to Eastern art and archaeology, I have been far longer connected with the Government of India than most English politicians. In Mr. Markham's interesting volume entitled "Indian Surveys" will be found a very clear and sufficient account of the beginning of Indian archaeology, and of its history down to the year 1860, when, more primary necessities having been supplied, its promotion was first recognised as a regular part of the duty of Government. 1861-2 was the first year of General Cunningham's activity as a Government archaeological surveyor, and from that period down to 1866, when the survey was stopped for a time, he did a great deal of useful work. In the year 1870 the survey was re-established under improved conditions by the Duke of Argyll, then Secretary of State for India, and General Cunningham was again appointed to take charge of it. He proceeded to India, organised his staff, and set about his work without delay. General Cunningham himself visited during the cold season of 1871-2 a great variety of places in the Gangetic Valley, from Mathura to Lakhisarai, and he described the results of his investigations in a long report amply illustrated. He also explored the great Mahomedan cities of Gaur, Sunargaon, and Delhi; but the account of these explorations has, so far as I am aware, not yet appeared. By no means the least generally instructive part of his reports is the division into groups which he proposes to make of the archaeological remains of India, which is as follows:—Hindu Styles.—1, Archaic, from B.C. 1000 to 250; 2, Indo-Grecian, from B.C. 250 to 57; 3, Indo-Sythan, from B.C. 57 to A.D. 319; 4, Indo-Sassanian, from A.D. 319 to 700; 5, Mediæval Brahmanic, from A.D. 700 to 1200; 6, Modern Brahmanic, from A.D. 1200 to 1750. Mahomedan Styles.—1, Ghori Pathan, with overlapping arches, from A.D. 1191 to 1289; 2, Khilji Pathan, with horseshoe arches, from

A.D. 1289 to 1321; 3, Tughlak Pathan, with sloping walls, from A.D. 1321 to 1450; 4, Afghan, with perpendicular walls, from A.D. 1450 to 1555; 5, Bengali Pathan, from A.D. 1200 to 1500; 6, Jaunpuri Pathan, from 1400 to 1500; 7, Early Mughal, from A.D. 1556 to 1628; 8, Late Mughal, from A.D. 1628 to 1750. In the hot season of 1871 General Cunningham's assistants, Mr. Beglar and Mr. Carlleyle, explored, under his control, Delhi and Agra respectively, and reported very fully upon these cities, dwelling, of course, chiefly upon what was not supplied in previous accounts. In his report on Delhi, which was published this year at Calcutta, Mr. Beglar argues in favour of the opinion that the famous Kutb Minar is of Hindu origin, an opinion from which General Cunningham emphatically dissents, in a preface to his assistant's report. Mr. Beglar also believes that the Hindus had a much larger share in the architecture of the Kutb Masjid as it now stands than his superior officer will allow. General Cunningham observes:—

"In the following report Mr. Beglar admits that the pillars have been more or less rearranged, but he contends that they occupy their original positions in the colonnade of a single Hindu temple, and that their present height is exactly that of the original Hindu colonnade. Consistently with this view, he is obliged to condemn the record of the Mahomedan builder of the Masjid regarding the destruction of 27 Hindu temples as a false boast. This opinion I consider as quite indefensible. The Mahomedan conqueror could have no possible object in publishing a false statement of the number of temples destroyed, nor in recording a lie over the entrance gateway of his great Masjid. I therefore accept the statement as rigidly true. It is, besides, amply confirmed by the made-up pillars of the colonnade on three sides of the court, which, as I have shown in my account of Delhi, must certainly have belonged to a great number of different temples."

I should be curious to know whether any one present who is acquainted with Delhi would subscribe to the following verdict of Mr. Beglar's, who is throughout less complimentary, as it appears to me, than his predecessors have been to the earlier Mahomedan architects. With regard to this question, as well as to General Cunningham's division of the styles, it would be extremely interesting to hear the views of Mr. Fergusson, whose long and distinguished labours in connection with Indian architecture are known to everyone, and for a fitting presentment of whose remarkable work on "Tree and Serpent Worship" the India Office deserves, I think, some credit. After describing and criticising the Alai Darwâza, Mr. Beglar says:—

"How great is the difference between the Hindu Kutb and this gateway! There not a line of ornament is introduced that does not point and emphasise some constructive feature; every feature there has an office to perform, and performs it well; it is emphatically a structure possessing harmony. The Alai Darwâza, on the contrary, has little of architectural ornament, and owes its beauty more to the carvings executed by Hindoo workmen, the last expiring effort of Hindu art in Delhi, than to any remarkable harmony of arrangement. Indeed, on *à priori* grounds, we should expect this want of appreciation of truthful ornamentation among the Mahomedans a barbarous and warlike people, whose religion narrowed their minds, naturally none of the most liberal, and demanded the suppression of æsthetic feelings. They could not be expected to reach a high standard in architecture within a short time, still less, then, could they be expected shortly after their conquest of India to produce structures worthy of admiration for harmony; and this is precisely what has happened, for with all the aid of elaborate ornamentation, carved, be it remembered, by Hindu hands, they have not produced any structure which commands admiration independent of mere beauty of ornament (for which the Hindoo workman deserves credit), or of sheer greatness of size, and as soon as they attempted to build without the aid of Hindu workmen, they produced what certainly is grand from sheer massiveness, but what is utterly devoid of that combination of qualities which produces in our minds the idea of beauty, independent of colour, carving, material, or mass. It is only after the Mughal conquest that Mahomedan architecture begins to be beautiful."

I have not myself seen these buildings, though I trust to have done so before many months have gone by, and should like to hear what some of



those present have to say about these criticisms. In the cold season of 1871-72 Mr. Beglar examined a number of places between the Jumna and the Nerbudda, to the south-east of Agra, but his report, if published, I have not yet seen, nor have I seen the result of Mr. Carlleyle's explorations in Rajpootana during the same period. In the cold season of 1873-74 the greater part of the Central Provinces was explored by General Cunningham and Mr. Beglar, the former of whom made, at a place called Bharahut, nine miles to the south-east of Sutna Railway-station, and 120 miles to the south-west of Allahabad, some very remarkable discoveries. When Professor Müller, in the course of the noble address which he yesterday delivered to us (and which again and again forced me to think of a remark which the great Alexander von Humboldt made to me at Berlin rather more than twenty years ago—that, namely, it was an honour to England that she afforded a career to such men) approached the subject of these discoveries, I confess I was somewhat horrified. Why, I said, here is the unhappy President of the Archaeological Section going to be robbed of the most interesting fact which he had to state. Happily, however, my great Aryan colleague only alighted upon the fact for one moment—fertilising it, no doubt, when he did so, like one of those insects to which Sir John Lubbock gave, the other day, at Belfast, a new interest, as the hon. member for Maidstone is apt to do to everything he touches. And so, I dare say, it will not be amiss if I give some part of General Cunningham's own account of what he has found."

Mr. Grant Duff then proceeded to give several extracts from a memorandum by General Cunningham, which was published in the *BUILDING NEWS* of August 28, 1874. He continued:—In a recent paper in the *Academy*, Professor Müller gave a warning on this subject, which seems important. He said:—

"Much depends on the date of these ruins, and here it is impossible to be too cautious. General Cunningham assigns them to the age of Asoka, 250 B.C., chiefly, it would seem, on account of the characters of the inscriptions, which are said to be the same as those found on the Sanchi stupa. But to fix the date of a building in India by the character of the inscriptions is a matter of extreme difficulty. The letters used for the earliest Buddhist inscriptions soon acquired a kind of sacred character, and were retained in later times, just as in Europe the old style of writing is preserved on architectural monuments of a later age. With all respect for the learning of those archaeologists who unhesitatingly fix the date of any building in India by its architectural style, or by its sculptures and inscriptions, we sometimes wish that they might imbibe a little of that wholesome scepticism which Sanscrit scholars have acquired by sad experience. If, however, the date of the Bharahut ruins should prove beyond the reach of reasonable doubt, we should have in the sculptures and inscriptions there found a representation of what Buddhism really was in the third century B.C."

So much for the work of General Cunningham and his assistants, but their work did not stand alone. In October, 1871, the Duke of Argyll called the attention of the Bombay Government to the importance of the production of a complete survey of the rock temples of Western India, and after some correspondence Mr. Burgess, the editor of the *Indian Antiquary*, was appointed to conduct an archaeological survey in that Presidency. He entered on his duties in January of this year, and in three months had returned to Bombay, bringing 54 photographs, between 25 and 30 inscriptions, about 40 ground-plans, sections, drawings of columns, &c., and 40 sketches of sculptures. I understand that Mr. Burgess is at present engaged in drawing up a report upon these. If the results turn out satisfactory, as there is every reason to expect, I hope the Government of India may see its way to allotting more money than it has yet done to the investigation of the archaeology of Western India by so active and competent an observer. Perhaps Mr. Burgess, who is in the room, will be prevailed on to address us to-day. These gentlemen, are the most recent doings of our official archaeologists in India, and I am convinced that with every decade we shall have a better and better report to give of the care which is being bestowed by the present rulers of India on the works of their predecessors. We are fond of denouncing ourselves for want of proper attention to these matters. There are few things that Englishmen like so little as being denounced by other people,

but there is nothing that they like so much as denouncing themselves. Cool-headed observers, however, looking at the enormous amount of absolutely necessary work that had to be done before the first beginnings of a civilised polity were laid in India, which was rapidly going to utter ruin when we first grew strong there, will be inclined to condone our insufficient attention to the preservation and illustration of ancient monuments in the past, if we only now attend to them sufficiently; and having had the opportunity of seeing a good deal behind the scenes in matters Indian, I think I may say very positively that those who administer the Government of India consider themselves more and more in all things relating to science, art, and literature in India as trustees, not only for their own countrymen and for India, but for the whole civilised world. That is a view which I strongly hold myself, and which, should circumstances again place me in an influential position in connection with the Government of India, I shall always do what I can to carry into effect. I had hoped at one time that a building which should have contained the India Museum, the great Indian library, and rooms for the Asiatic Society, might have risen at Westminster as a fitting monument of the presence in the India Office of the Duke of Argyll, the one man of high scientific attainment whom the conflicting tides of English politics ever carried into the great place of Secretary of State for India. The fall, however, of the Gladstone Government swept the Duke of Argyll away from the India Office, just as the great deficit of about six millions which he found upon attaining to power—a deficit for which I ought in justice to mention hard times, and not his predecessors, were responsible—had under his auspices been filled. I trust that the realisation of my hopes will be only deferred, and am well content that if the thing is done, the honour of doing it should belong to our successors in power. Before concluding I wish to mention to our foreign visitors the paper which is published by the India Office every year, giving an account of the "Moral and Material Progress of India." It is very little known upon the continent of Europe, and its wider diffusion would, I think, correct many errors about our doings and not doings in the East which are rather widely prevalent. It can be obtained through any respectable bookseller in London, and is extremely cheap. Thanking you for the kindness with which you have listened to this address, I now declare the Section of Eastern Art and Archaeology to be open.

The first paper read was by Professor Ezzeling, the Secretary of the Section. It was "On the Inscriptions of Southern India." These inscriptions were mostly on copper plates. Many of them were to be seen on the table in front of the chair, and were examined with great interest by many of the audience.

The second paper, "On the Nassick Inscriptions," was read by Professor R. G. Bhandarkar, M.A., of Bombay. Other papers followed.

Mr. J. W. Bosanquet, Treasurer of the Society of Biblical Archaeology, received the members of the Congress at an afternoon garden-party at his residence, Claymore, Enfield, from 3 to 6 p.m.

#### ON THE ADVANTAGES OF A CONSTANT AS COMPARED WITH AN INTERMITTENT WATER SUPPLY.

At the recent meeting of the British Association at Belfast, Mr. Deacon read a paper on his water-waste meter. In the discussion which followed, Mr. F. J. Bramwell, C.E., made some valuable observations. He said: I believe that most serious injury to health has been occasioned by the system of cistern storage. Cisterns are of necessity cumbersome. They have to be put somewhere out of the way, and commonly careless or ignorant builders or architects fix them in all but inaccessible places, where they are out of sight and out of mind, and thus attention is not paid to keeping them clean, and all sorts of filth accumulate; but, bad as this is, it is not the worst result of the system, for too commonly the cistern for general purposes is placed in close proximity to that part of the house from which it ought on every ground of health and of common decency to be the furthest away, and it appears as though the very effort of the constructors of such houses is to make arrangements for the express purpose of contaminating the water. Those who travel on the suburban railways of London and observe the backs of the

poor dwellings in the neighbourhood of some of those railways must have noticed that commonly the only cistern was exposed to the full heat of the sun, and was carried on the top—in fact, formed the roof—of an outbuilding from which filthy gases emanate to be absorbed by the water, and thus that which should be the source of cleanliness and health was fouled and poisoned as a preparation for its use. That water can be rendered the carrier of disease by the absorption of foul gases I presume few present will doubt; but I may refer you to a recent statement in the *Times*, where it was shown that typhoid fever had been communicated to a number of cottages by the vapour from a drain in which the slop-water of the washing of the linen of the first patient suffering from that fever had been thrown. By placing cisterns where they could receive foul gases, I have no doubt but that disease might be spread through a house, but, worse than this, the intermittent system is attended (when the supply is shut off, and the lower cisterns are filling from the water remaining to the higher parts of the pipes) by an indrirt into the general service main, and in this manner, as is well known, foul gases, and, in some cases, even foul liquids, had been drawn into those mains; and thus the disease is laid on from one house to another.

The constant service affords an agreeable contrast to this catalogue of loathsomeness. The water being always at full pressure in the pipes, all that is required is to turn the tap and draw the water cool, and as pure as it may be when supplied, unpolluted by foul gas or by foul liquid. But it is said by those among water-works engineers and managers who still advocate the intermittent supply that even, assuming all these things to be true, the intermittent supply is a necessity, and that the waste of a commodity that is not paid for according to the quantity used, but is paid for in an annual rate, must be so excessive if the service is constant, that whatever may be the evils of intermittent supply, they must be submitted to, as the only means of preventing gross and unbearable waste. But the fallacy of these arguments has been exposed, and so successfully exposed, by the advocates of the constant supply, that the Legislature has for many years past insisted on inserting in each Act for the supply of water to provincial towns a clause to secure constant supply; but this legislative care is operative in provincial towns only, and there is one most important exception to this otherwise now general rule, and that exception, unhappily, is in the case of the metropolis.

In London, with its three and a half to four millions of inhabitants, the water supply is given over to eight companies, who reign supreme; the metropolis is divided into districts, each company has its own, and there is no competition, no new company is permitted, and London is powerless. Various checks have been suggested, and some have even come into operation; but the result is that, practically, the companies do as they please. Many years ago an Act was passed to give a constant supply to London, but the section will readily see that it is a perfectly dead letter when I tell the members that before a company can be compelled to afford a constant supply it must be demanded by a very large majority of the inhabitants who are served by a "district main." It turned out that the term "district main" had no recognised meaning, and that it was impossible to tell what group of houses would satisfy this term; the result was, the Act was never put into force. About three years ago an Act was passed to cure the blunder in the former Act, and to obtain a constant supply for the metropolis. One of the provisions of that Act is, that within six months the water companies should frame a set of regulations for the "fittings," and that those regulations should be submitted to the Metropolitan Board of Works, who, if they disapproved them, were to be heard before the Board of Trade. The eight companies drew up their regulations. The Metropolitan Board of Works did me the honour of referring these regulations to me for examination and for a report, and, as I considered them most oppressive, I advised they should be opposed. I trust the section will bear with me while I mention one or two of the clauses of the regulations. The use of cisterns must be continued; nevertheless, all the pipes in the house must be replaced with pipes of a great strength, unless, indeed, they happened to be of the excessive thickness demanded, which, however, was most unlikely. If there were a bath in the house, it must only have one opening for inlet and for outlet, so that



the clean water must come in through the dirty outlet. Moreover, it must not have a waste-pipe, because the water might be left on accidentally, and, if so, the owner would be punished by the bath overflowing and spoiling his ceilings and walls, and, perhaps, a few pictures. Cisterns were not to have any overflows except of a particular kind—that is, they were to be brought through the house wall into a place where the officer of the company could see them. When it was objected that this would in many cases involve great length of pipe and serious cutting away of plasters in order to carry the pipe down within the house to about the pavement level before bringing it through the wall, it was said, "Oh, bring it out through the nearest wall at whatever floor the cistern may be," and the representatives of the company did not see any particular objection in the fact that any householder who did this would be liable to an action for damages for suddenly giving a shower-bath to a passer-by, and they seemed to think the suggestion that ladies would not like to have good dresses or bonnets thus spoilt an idle one. The commissioners before whom the regulations were discussed very greatly modified them in favour of the public, but nevertheless the Act is still practically inoperative, and probably will be till another outbreak of disease causes fresh alarm.

During the discussion on the question of constant supply to London, the advocates for it instanced Norwich, where, under efficient supervision, the consumption per head fell from between 25 and 30 gallons per diem on the intermittent system, to 15 gallons on the constant; Manchester, a large city, where the result has been nearly as markedly favourable in relation to the constant supply, and Sheffield, a town where it has been most successful, the supervision there having brought down the consumption to many gallons per head less with the constant than with the intermittent supply. On the other hand, the supporters of intermittent supply in the metropolis have said, "Look at Liverpool; here is the case of a town which began on the constant supply, and had to give it up, the waste was so great." No doubt this was so, and it was always felt to be a powerful argument in favour of the London advocates of an intermittent supply. They said, in effect, the requisite supervision becomes unfavourable in large towns (although Manchester was a success), and thus Liverpool was made a standing reproach to the constant supply system. Liverpool was on the intermittent service when Mr. Deacon was selected to be the engineer to the Water Committee. Happily for Liverpool, and happily for the question of constant service, Mr. Deacon was not content to fold his hands and put up with things as he found them without an attempt to better them. He saw the expense and difficulty attendant upon a house-to-house inspection of the state of the fittings; he knew how offensive such inspections are to those who are behaving properly and honestly; and he set himself to devise an instrument by which he should be able to form a very good idea in which houses waste was going on, and to inspect those houses, and those only. His reflections on the subject had resulted in the water-waste meter which was now before them. This had been successfully in operation in several of the districts where the Water Committee, before determining on adopting it generally, thought it advisable to have an independent opinion on the subject, and they requested me to investigate into and to report upon it. In consequence of this request I put myself into communication with Mr. Deacon, and visited Liverpool. I first tried the meter, under very varying heads, delivering water into tanks of known capacity, to ascertain the correctness of its registration. This I found to be very satisfactory. I then spent the greater part of two nights in the streets of Liverpool, going with the inspectors through two districts to which the meters had just been applied. The results were most striking. On visiting one of the meters at midnight it showed a consumption of about 3,000 gallons an hour. Going on, passing through the district, the inspectors applied the key to the stopcock outside each house, and, on the ear being put to the top of the key, the presence or the absence of sound indicated whether there was water running through or not. By closing the cocks when the noises were heard, and leaving all the others open, it was found on revisiting the meter that a waste of 2,200 gallons an hour had been arrested. The few houses where the stopcocks had been closed were noted, and these houses

alone were the subject of visits from the inspectors on the following day. I believe the apparatus is one which may be thoroughly relied on as not likely to get out of order, and that it would enable perfect control, at the least possible cost and with the least annoyance to the inhabitants, to be maintained over a district; and I think the Corporation of Liverpool are to be congratulated for having selected as their engineer a gentleman who, by his intelligence and inventive talent, will not only save the Corporation many thousands a year, but will restore the boon of constant service to Liverpool; and I further think the advocates of that service throughout the country, and all those who are interested in sanitary science (in truth, that means the whole population) are indebted to Mr. Deacon for having made this important improvement in facilitating the adoption of constant service.

#### OLD MALTON PRIORY AND SCARBOROUGH.

THE church of St. Mary's, Old Malton, is only a fragment of what was once a noble minster with three towers, founded for the Gilbertine canons in 1150 by Eustace St. John. In it Gilbert, founder of the order of Sempringham, who died in 1189, was buried. He designed that the monastery should contain thirty-five men. In its integrity the priory church possessed a transept with eastern chapels, a choir with aisles, and a short square-ended presbytery, and it is possible now to trace a faint outline among the huge mounds which cover the meadow which slopes to the banks of the Derwent. Now, it has lost its western triplet, its north-west tower, the aisles and clerestory of the nave, and the entire east end, including two bays of the body of the church. The bases of the enormous western pillars of the crossing remain, with the shafts at the east end of the south nave aisle, which retains only a cinquefoiled pillar-stoup adjoining a round-headed procession-door. Another doorway of richer character, with the beak-head and chevron ornaments, has been rebuilt on the north side. Barbarous usage exceeded its ordinary malice here, both sides of the building being coated with modern masonry, which, on the north side quite conceals every ancient feature, and on the south permits less than half the original pillars, which are of Transitional Norman date, with moulded capitals, and the outer mouldings of the arches, to be seen, together with a single jamb of a clerestory window, and the large circular outer arches of the triforium. A weather moulding on the side of the tower is proof that the aisle roof also inclosed the triforium. An outer doorway in the tower shows that the conventual buildings were carried clear of it—that is, eastward.

The interior (and buildings of this order are very rare), however, is full of interest, even in its degradation. The nave retains only six out of eight original bays; on the second north pillar from the east there is a square canopied niche for an image. The fourth pillar is cased with canopied niches in two tiers; part of the cornice has been reversed, but these parts of an inscription remain: "Rogerius Pri (or ?) Orate pro bon . . . fratri . . . cari . . ." with this rebus, a tree piercing a tun, and a bolt through a woolpack. This is of Perpendicular date, like the arcking in the three western bays which supercedes the triforium. The pillars are octagonal. On the south they are round. The triforium on this side resembles that in the three eastern bays upon the north, consisting of two open arches under a comprising arch, with a quatrefoil in the head, and flanked by a more pointed arch on either side. The westernmost pillars, like the fifth on the north, are shafted, clearly being under reconstruction in the Perpendicular period, when the example of Bridlington probably stimulated an unfortunate rivalry.

The lower story of the tower (like the entire west end, of the latter part of the twelfth century) is vaulted. The upper stage exhibits two tall, pointed open windows with a quatrefoil in a circle above each head. The lower window has a very remarkable ornament in the jambs, profusely used: it is like a ballflower in bud, of conical shape, ending in a sharp point, with six lateral flutings. The grand western portal of six orders (filled with commonplace new doors) has in its mouldings the violet, a four-leaved flower, and a diamond-fretty pattern, like an ornament at Lincoln Cathedral. The shafts here and in the windows are banded at mid-height. The jamb of

the great western window are studded with the violet. The round-headed insertion, with the meanest attempt at tracery, is to the last degree execrable. It is only rivalled by the preposterous and contemporaneous arrangement of mock-stalls along the east wall. The central space was covered up, as the painters were at work. This paltry woodwork, fortunately, has been the means of preserving the misericords—good, honest, bold sculptures of great vigour, but late in execution. No. 1 denotes their several subjects; 2, marks the pattern of the elbow rest. They range from north to south and face the congregation, with an effect eminently incongruous and grotesque. Restoration is urgently needed in every respect, both in the fabric and furniture. The misericords represent

I. An ass, with long flowing head-gear; 2, a goose.

II. A lion; 2, a fox crouching.

III. A winged dragon; 2, an unicorn.

IV. An owl; 2, a hare.

V. An eagle; 2, a beast with a scaly neck.

VI. A rabbit; 2, a snake.

VII. A camel, bridled; 2, a beast with a snake's tail.

VIII. A crab; 2, a cockatrice; a bird's head.

These designs were probably taken from a Bestiary. No human figures appear.

The tower, with fissures, subsiding arches, and a very perceptible settlement on the east side, appears in a delicate condition, and the augury from past treatment of the building is a sad one. The changes in it were evidently made by a sordid pulling down of faulty portions piecemeal, bit by bit, till the present miserable residue only was left, to the disgrace of the parish.

The cloisters were on the south side, and a substructure still existing under a modern house was probably the cellarage upon which the refectory was built. Buck's view shows the round-headed clerestory of the nave, the south wall of the aisle with a processional door at the east end, a part of the substructure of the rooms of the lay brothers, with an external arcade, and on the east side of the garth a small door; a fine portal to the slype with the lozenge or diamonded ornament, and the grand entrance to the chapter-house of four orders, flanked with a window on each side.

I was in hope that the register now in the British Museum would have thrown light on the history, but I could only glean a few facts:—

1. That Roger was prior in the time of P. Alexander III. 2. The date of the foundations. 3. That there was a rood in the great church (i.e., in the nave), with a light before it; and 4. That there was an hermaphrodite convent, consisting of fratres and sorores in different buildings. The senseless violence of vulgar greed or polemical destruction has deprived us of a curious insight into the arrangement of one of the finest houses of the Order of Sempringham, the only one of distinctively English foundation.

The List of Chantries in the Public Record Office notices only those in St. Leonard's and St. Michael's, New Malton, and St. James's in the Castle.

#### SCARBOROUGH.

Cisterian architecture under modification of the strict rule, is well illustrated in the ground-plan of St. Mary's, Scarborough (King's Co II. B.M. XLIV., 47A., and Addit. MS., 6756, ff. 219—223), which was an alien convent, and cell of Cîteaux, to which Richard I., in 1189, assigned the parish-church of Scarborough. The nave, which was continued as a vicarage church, and confirmed by Edward I., has undergone a remarkable change. The original building consisted of a nave of six bays, with aisles; it had a clerestory. Now the weather moulding of the aisle roofs may be seen on the walls of two western towers which existed in 1486, according to a plan in the British Museum, and are mentioned in Leland's "Itinerary" in these terms:—"The church is 'very faire and is isled on the sides and cross-isled, and hath 3 auncient toures for belles with pyramides of them, whereof 2 toures be at the west end of the church and one in the middle of the Cross Isle.'" (Vol. I., fo. 67.) A traditional view, by Haymes (1737-8) shows the three spires, and a choir with five windows. The church had exceptionally tall steeples, with spires, and a central tower of two stories, capped with a low spire, as portrayed in an engraving by Francis Place (or Kip) now in Scarborough Museum; and another view by Settrington (1735), which shows a spire and four pinnales; a door is marked in the easternmost chapel



next the transept. These spires were an infraction of the rule, just as the presence of a parish-church under the minster roof and its site in a populous town were in desertion of strict Cistercian principles. In the middle of the fourteenth century the wall of the south aisle was removed, and straining arches erected across it; and a view was thus obtained of four chantry-chapels, with ribbed vaulting, which were erected eastward of the porch, which has a parvise, and was subsequently reconstructed. These chapels are divided by solid walls; two of them contain a sepulchral recess and ablution drain; another has a drain; and a fourth an ambury. Their roofs are made of slabs of stone; the tracery of the windows is modern, and the range of gable-fronts makes a very picturesque group. At Chichester, a secular cathedral, and Melrose, which was Cistercian, there is a similar arrangement of lateral chapels. At Rievaulx also chantries were erected between the buttresses of the choir. The dedications here were St. Nicholas, St. John, St. James, erected by Robert Golland; and St. Stephen, founded by Robert Rillington; taking their order from east to west. The list in the Public Record Office notices those of St. James, St. Stephen, and St. Mary, Percy's, and the Charnel-chapel of St. Mary Magdalene, which was on the north of the precinct attached to a cemetery. On this side the great arcade presents a most remarkable appearance, and offers ample room for speculation. The solution probably is that the parish commenced their portion of the work at the west end, while the monks were proceeding westward. The two eastern pillars, like all those upon the north, are Transitional, and probably mark the termination of the conventual choir; indeed, on the south side of the pier of the crossing, there is a portion of Early work, which it is likely formed the side of the original arch of the Early English aisle, opening into the south wing of the transept. The remaining pillars are Early English; one has four shafts banded at the centre, and arranged round a central pillar; another is octagonal, and a third, a quatrefoil in plan, has a little niche for an image. This curious experiment of varying the elevation is far from successful, and has resulted in distorting the lines of the vaulting shafts, which here do not coincide with the centre of the spandrels, the spacing of the arches being quite different from those on the north. One object, however, was attained by this curious arrangement—an open space on the inner front of the porch door, and an ampler view into the western chapel. A glance at the ground-plan will show that the whole southern arcade is later than the north side, and laid out by other hands. It is known that the burgesses and commonalty maintained a chantry of St. Mary.

One consequence of the addition of the outer chapels is the entire obscuration of the clerestory on the outside. It consists of single Early English lights, deeply played on the inside face.

Upon the outer side of the north aisle, a large chapel was erected, being of four bays, and parted off by three pillars having grotesque capitals of the fifteenth century. Of its history nothing is known; tradition suggests that it was intended to supply the place of some parish-church that had been destroyed. Over the door there is a trefoiled decorated niche. At the west side there is a prolongation to the line of the west front, formerly parted off by a wall from the aisle. At the east end of the aisle the mouldings of the door which opened into the transept are visible in the wall.

The western bay and front are Early English, forming a kind of Galilee, as in the grander plans of Lincoln, Peterborough, and once at Bury-St.-Edmund's. The pedimented shallow porch was of the fifteenth century; but it has been partially rebuilt.

The south wing of the transept is shallow and aisleless. It is Transitional Decorated, with monumental recesses containing stone coffins in the south wall. It now forms an organ-chamber and vestry; on the exterior to the north is a fragment of the wall of the choir aisle.

The eastern arm was of five bays, with a central door in the south wall, and aisles; part of the south wall was standing in 1745 (King's Coll., XLIV.—47 F.). It underwent some changes in the fifteenth century, after the rectory of the alien minster had passed into the hands of the Austin Canons of Bridlington, when it was dissolved by Henry IV.

On October, 10, 1659, the central tower, which had been injured in the siege of the Castle by the cannonade in 1604, fell, and was rebuilt in 1699 with a hazy regard to the original style, and of smaller proportions. The choir was turned

into a battery on February 18, 1644, by Sir John Meldrum and the Roundheads. The Loyalist garrison replied with a destructive fire, and we have to mourn the loss of a noble building. The repairs of the tower were made in 1660, at a cost of over £3,000.

Another anomaly was the divergence in the position of the conventual buildings; they lay to the south-west of the church, a road on the north and a deep declivity on the south precluding their erection in the ordinary place. A pentice seems to have been carried on continuously inside the north wall of the Precinct. Eastward of the minster was the Paradise, a name for a cemetery still preserved in the cloister garth of Chichester. The fragment of the Close wall still exists, and the site of the Court of Pleas and Abbot's Palace is laid down upon the Ordnance Survey map.

MACKENZIE E. C. WALCOTT.

## WATER SUPPLY OF ANCIENT CITIES.\*

IN ancient times the water was always allowed to flow of its own accord from a high source to the reservoir, along a channel prepared for it called an aqueduct. Aqueducts existed at a very early date indeed. Among the first mentioned was one erected by Solomon, to convey water from Bethlehem to Jerusalem. It was similar in construction to much more recent works, the conduit being 3ft. square, and built of freestone, strongly cemented, and coated lin. thick with plaster. The stones were 15in. thick. But the system of aqueducts never reached such perfection as it was carried to in Rome. There vast sums of money were expended on these great public works, and their ruins show that they had been executed in a style of corresponding magnificence.

The first Roman aqueduct was constructed about the year 442 B.C. by the Censor Appius Claudius, whose name it bore. Its total length was about twelve miles. Another was commenced forty years after this, which brought the waters of the river Anio to Rome, and the expense of the work was defrayed from the spoils taken in the war with Pyrrhus. Thus, then, were aqueducts from time to time constructed until, in the time of Nerva, A.D. 96, their number had increased to nine, and before the seat of government was removed from Rome to Constantinople there were about twenty altogether. The management of these works was intrusted to a public officer, and the position he held was considered very important. Indeed, the office of *Praefectus Aquarum* was only bestowed on those of the highest rank, who had served the State well, and distinguished themselves in war.

As the principles observed in the design of the aqueducts were the same for all, it may be well to consider for a short time the mode of their construction. From the inlet at the source until the water was delivered in Rome, the stream was conducted along a closed chancel or specus, having a regular and uniform slope or fall towards the city. The inclination given by the Romans

varied from  $\frac{1}{200}$  (Vit.) to  $\frac{1}{400}$ , being much greater than that generally allowed at the present time; but this may have been necessary for the better scouring of the specus and for preventing any deposit of mud or silt.

In order to maintain the channel at the proper level it had sometimes to be raised on an earthen embankment, or carried on a series of arches, and sometimes sunk underground and tunnelled through rock. Embankment was employed when the culvert was slightly above the level of the ground, but when valleys had to be crossed the channel ran on the top of lines of arches. When the level was very much above that of the ground, a second or third tier of arches was built on the lowest series, and the specus laid on top of all.

Our notions of Roman waterworks are apt to be exclusively associated with these gigantic erections, but they supported only a small portion of the total length of the specus. Thus, we find that in the time of Frontinus, A.D. 96, the total length of all the aqueducts was about 278 miles, and of these 28 only were supported on arches. By far the largest part of the channels was below the surface of the ground, for of the 278 miles we find that 243 were underground work. However, the vastness of the conception and

the great energy in execution displayed in the construction of these lines of arches give them deservedly a prominent place in our consideration of the Roman aqueducts.

The specus were generally made with rectangular section, or with three sides of a rectangle and an arched roof. They varied in size from 4ft. high by 2ft. wide to 6ft. high by 4ft. 3in. wide. It will be allowed that this section for an aqueduct is not well suited for keeping the channel clear of deposit, but the great velocity at which the water must have flowed would have tended to counteract this.

The specus were built of stone or brick, except when they were tunnelled through rock, in which case a brick lining was considered unnecessary. In order to make the culvert water-tight it was coated carefully on the inside with plaster laid on in separate layers. The tunnelled parts of the line seem to have been coated with plaster equally with the parts having the brick lining. The plaster which Pliny declares was found to be the best, was composed of fresh lime slaked with wine and rubbed with hogs lard and the juice of figs. This was rather a strange composition for a plaster; never likely to be used in this country. However I have made a little of it for an experiment, and find that the plaster is very much inferior, on the whole, to cements made now on a far cheaper plan; but the surface becomes very hard and resists water well.

It is natural to suppose that a large quantity of air would be drawn into these channels by the flow of the water; so, to prevent any serious consequences from the air thus becoming accumulated and compressed in the specus, holes were made which communicated with the open air, and presented a ready escape for the compressed air in the interior. These openings were placed about 130ft. apart along the aqueduct.

When the water had been brought to within about seven miles of Rome, it flowed into a settling pond or piscina. The piscina consisted of a large covered space in which the water might spread out; and thus, having lost its velocity, the mud in suspension would be deposited, and the clear water would enter the continuation of the specus on the other side. The covering consisted of a series of arches, forming long vaults transverse to the line of the aqueduct. The passages for water from vault to vault were so arranged as to be in echelon, so that the water was checked as much as possible in its passage through the piscina. In some piscinae the water passed through four vaults, which were so arranged that two were on a level with the specus, and contiguous, while the other two were immediately under the first two. The water flowed from one on the top into that below it, and from this passage into the other low vault, rising out of it into the one above, when it again entered the specus. The works were all coated with cement, which remains in many cases intact at the present day.

When the aqueducts approached the gates of Rome great care seems to have been bestowed on the decorative building of the arches, especially when crossing any of the main roads.

The specus delivered the water at last into a castellum, or service reservoir, from which proceeded pipes to the public baths, private houses, or public fountains through the town. Some of the pipes emitted water on the spot to those who chose to come for it, and were, in fact, large public fountains. The name of the castellum may have been given to these reservoirs from the fact that several similar buildings were erected along the course of the aqueduct, in which resided the soldiers who had to guard the works, and the masons who kept them in repair.

The bulk of the people of Rome carried the water from the public fountains, while the higher class had service pipes laid from the castellum to their own cisterns. The quantity of water allowed was regulated by an officer at the castellum, who by means of cocks could stop the supply at pleasure. The pipes in which the water was distributed through the town were made of lead or earthenware. The leaden pipes had a section somewhat oval and pointed on the top. They were not soldered, but simply pressed together, and it is just possible that the old Romans knew that two clean surfaces of lead when pressed firmly together, unite securely and form a perfect joint.

They certainly had the same dread of the solvent action of soft water on lead which exists at the present day. Vitruvius recommended earthenware pipes on this very ground, because "water conducted through earthen pipes is more

\* By Lieut. MCHARDY. From the Papers of the Royal Engineers.



wholesome than through lead; indeed," he says, "that conveyed through lead must be injurious to the human system." Their earthenware pipes had generally a diameter of about 2in., and were tongued into one another. In order to strengthen the joints, which were sometimes subjected to a pressure of 200ft., and therefore were liable to give way, the Romans inclosed them in an envelope of mortar, made with pounded brick, which set so firmly as to make the joints the strongest parts of the pipe.

One other point let us notice—that the Romans never brought the water to the light until it was to be used; and on this account they must have had it free from animal and vegetable impurities which so readily appear in water exposed to the sun's rays.

#### THE WESTERN PUMPING STATION.

A MASSIVE pile of buildings with a very lofty square smoke-shaft in the rear is now fast approaching completion in the Grosvenor-road, Pimlico. The buildings face the river (which is here embanked) and closely adjoin the railway bridge by which the trains of the London and Brighton and the London, Chatham, and Dover Railway companies approach Victoria Station. They are being erected by the Metropolitan Board of Works, and form one of the last links in the great metropolitan main drainage scheme. In devising the routes and levels of the main drainage intercepting sewers for the diversion of the sewage of London from the Thames, difficulties presented themselves which at one time threatened to preclude Hammersmith, Fulham, Brompton, Kensington, and Chelsea from participating in the advantages of the main drainage system. The northern low level main intercepting sewer necessarily rises gradually towards the west from the outfall in the east of London, and if extended with a rising gradient beyond a certain point westward would rise to the surface of the ground, and so above the level required for the discharge of the local sewers and house-drains. On this account it was proposed in 1858 to separate the localities named from the rest of the main drainage system, and to convert them into a separate main drainage area, which was to be called the western district, having an area of about 22 square miles. Its main sewers were designed to converge to a point near Cremorne Gardens, where a pumping station and deodorising works were to have been established, and the sewage discharged into the Thames. Great objections were raised to this plan, however, and in 1863 the Metropolitan Board of Works decided to take the sewage of the western district down to Barking, by means of an intercepting sewer in the line of the then contemplated Chelsea Embankment, with pumping station east of Chelsea Hospital. These works were to convey and lift the sewage of the western district into the low level sewer, which had, therefore, to be increased in size all the way to Abbey Mills, the power of the Abbey Mills engines proportionately increased, and the capacity of the outfall sewer and of the Barking reservoir similarly augmented. But the western district could not wait for drainage until the rest of the main drainage system was completed, and as there was then no Parliamentary Authority for the formation of the Chelsea Embankment, the main sewers for the western district were constructed, and a temporary pumping station was erected near to Cremorne Gardens, where the sewage is now lifted into the river. With the Chelsea Embankment the missing link in the line of sewer is now completed, and when the engines of the Western Pumping Station are set in motion, all necessity for deodorising works at Cremorne will be abolished, for the sewage will cease to flow into the river at that point, and will henceforth find its outlet at Barking Creek, seventeen miles lower down the river. This pumping station provides power to lift the sewage and a part of the rainfall contributed by the district, together estimated at 38,000 gallons per minute, a height of 18ft. into the low level sewer, which extends from the Abbey Mills Pumping Station to Pimlico. The requisite power will be obtained from four high-pressure condensing beam-engines, of an aggregate of 360 horse-power, each engine actuating two single-acting plunger pumps, and the whole being supplied with steam from eight double-flued Cornish boilers, 6ft. 9in. in diameter. The engines will be arranged in pairs within an engine-house fronting the Grosvenor-road, the boiler-house being placed at its rear. Supple-

mentary power, to be used in case of accident to the principal engines, or any similar emergency, is to be provided by an additional high-pressure non-condensing engine of 120 horse-power, supplied from two boilers similar to those for the principal engines. This engine and its boilers will be erected in a separate building, to the rear of the main buildings, near the canal. The flues from both sets of boilers will be connected with a massive square chimney-shaft 172ft. high, 21ft. square at the base, and tapering gradually to 15ft. square at the apex. On each side of the shaft are three recessed panels, which are arched over a short distance below the entablature which surmounts the shaft. This shaft rests on a solid bed of concrete 35ft. square, and carried right down to the London clay. The coal-vaults are situated on the west side of the engine-room, and are far below the ground, the floor being level with the stoke-hole and the boiler-house, into which the coals will be conveyed on a tram. Three lines of trams will also be laid on the top of the vaults, and from these the coals will be shot down into the vaults through openings in the arched roof. Beneath the coal-vaults is a large arched chamber to be used as a reservoir for condensing water. The buildings also include repairing shops, stores, superintendent's house, and workmen's cottages. Between the stores and the workshops is a large settling pond, elliptical in shape, and measuring 142ft. by 68ft. and 16ft. 6in. deep, for the purpose of purifying the Thames water previous to its being used for condensation, and afterwards for the boilers. The sides of this pond are formed of concrete faced with brickwork, the floor being of concrete only. The pond will be uncovered at top and divided into two compartments, with the object of allowing one to be thrown out of use for the purpose of being cleaned. The sewage from the western districts will be conveyed by a circular sewer, 6ft. 9in. in diameter, from the Chelsea Embankment along the Grosvenor-road to the front of the engine-house, whence it will be diverted by a double channel, one leading to the well under the principal, and the other to the well under the auxiliary engine-house, each channel being furnished with a penstock to direct the sewage to either point. After passing the penstocks the sewage will enter a chamber containing an open iron cage, by which any large substances will be intercepted previous to the sewage arriving at the pumps. The iron cage is to be lifted by machinery in a covered passage below the surface of the ground, the contents there to be emptied into trucks and carried away by tram. The filth cages are to be in duplicate, so as to admit of one being emptied while the other is in use, the flow of sewage being uninterrupted. The maximum quantity of sewage to be lifted is estimated at 6000 cubic ft. per minute, the height of lift being 18ft. The pumps will deliver the sewage into branch cast-iron culverts 5ft. in diameter, and thence into a main 6ft. 9in. diameter, leading into the low level sewer, which will convey the sewage to the pumping station at Abbey Mills, where it will be again lifted into the high level or outfall sewer, and conveyed to Barking Creek, where it will be discharged into the Thames. The works have been carried out from the plans and under the personal superintendence of the engineer to the Metropolitan Board of Works, Sir J. W. Bazalgette.

#### ARCHÆOLOGICAL.

ILCHESTER.—At Ilchester, in the county of Northampton, on Saturday week, workmen, whilst digging for ironstone, came upon a stone coffin 6ft. from the surface, the body of which was hewn out of solid stone, being in a good state of preservation. The lid or cover, composed of one slab of stone, was made fast to the body of the coffin by four wrought-iron clamps, fixed in the stone in the same manner as is usual in the present day. On removing the lid it was found that the principal bones of the arms and legs, together with a portion of the skull (to which was attached a small quantity of apparently light auburn hair), alone remained; the rest had returned to dust. From the leg bones was collected some fibrous substance, which on closer examination appeared to be a part of a burial garment. This burial-ground on which the remains have been found is hard by a Roman encampment, and during the last twelve months, during excavations, no less than two or three hundred skulls have been turned up, some of them very perfect, and in not a few of them the teeth were in a fine state of

preservation. Other rudely-made tombs have been discovered, consisting only of loose pieces of flat stone, placed vertically, and surmounted by a stone slab. Several bronze bowls have also been found; two of them, which were beautifully perforated, were evidently used for culinary purposes. Coins of Faustina, Adrianus, Gratianus, Antoninus, and Constantinus have been picked up in the immediate vicinity, clearly denoting the age to which they belonged.

ROYAL INSTITUTION OF CORNWALL.—The annual "archæological picnic" of this Society took place on Tuesday week. Starting from Lostwithiel at nine a.m., the party first proceeded to the ancient and beautiful ruins of Restormel Castle, which, so long ago as the War of the Barons, was a place of importance. It was held for a time by Simon de Montfort, and subsequently was transferred by the widow of the last of the Cardinham to Richard Earl of Cornwall, by whom the Castle, of which the ruins still stand, is supposed to have been rebuilt in the thirteenth century. The existing remains are evidently (according to Dr. Barham, who acted as *cicerone*) only those of the castle-keep, all the outlying buildings having long ago disappeared. Indeed, it appears that so long ago as the reign of Elizabeth there was not much more of the Castle in existence than at the present time, or Norden, a contemporary writer, thus bewails its decay:—"The whole castle beginneth to moulder, and to wringe out hard stones of teares; that she that was embraced, visited, and delighted with great princes, is now desolate, forsaken, and forlorn." And, regarding the greatness and grandeur of the establishment, he thus quaintly expresses himself: "If the proportion of necessarie offices in auintient decayde buyldinges may argue equall hospitalitie, here was noe want, as by the reliques of a ruyned oven of 4 yards and 2 foote diameter it may appeare; and it is to be thought that in those dayes they buylded for vse, and not as men now doe their great and glorious houses for ostentation—great halls and little meat, large chymnies and little smoak. This ruyned oven layeth open her entrayles that men may yet see the bounty of pristine ages." The kitchen, with the immense oven or fireplace to which Norden alludes, is still distinctly traceable. Returning to Lostwithiel, the party visited the Guildhall, built in 1740; the Church, with its unique lantern-spire and grotesque fourteenth-century font, and "the Palace," otherwise the ancient Exchequer, Shire Hall, Coinage Hall, and the Stannary Prison. This relic of Lostwithiel's greatness has been sold by the Duchy, and is used as workshops and storerooms, having been hopelessly modernised. Having partaken of luncheon at the Talbot Hotel, Lostwithiel, the party drove through some charming scenery to the famous entrenched encampment known as Castle Dor, or Castle Dwr—water castle, because it commands two estuaries beneath. It is a circular earthwork, with an internal diameter of about 225ft., and inclosed by a double *vallum*, which is still distinctly traceable. An inscribed stone, about a mile nearer Fowey, was next visited, and a rubbing taken of it by Dr. Barham. It appears to have been erected in memory of one Ciriusius, and has a T cross on the back, but the stone has been removed from its original site. At Fowey the splendid castellated mansion or "Palace" of the Treffrys was visited, under the guidance of the Rev. Dr. Treffry. It is constructed entirely—floor, walls, and vaulted roof—of beautifully-marked Cornish porphyry, porphyritic granite, and jasper, brilliantly polished. The church adjoining (now in course of restoration at a cost of £3,500) has some very curious and grotesque figures on the font, one of which represents a whale with the head of Jonah protruded from the mouth—the head being as large as the whale's head. Having partaken of the hospitality of Mr. Rashleigh, the party returned to Lostwithiel from Par Station.

#### COMPETITIONS.

THE MARGATE DRAINAGE COMPETITION.—At a special meeting of the Council on Tuesday week a letter was read from the Local Government Board, in which the Secretary stated that the Board would be glad to be informed what decision the Council had arrived at with regard to the sewage of the town. At a subsequent stage of the proceedings the Borough Surveyor read his reports on the various drainage plans, each scheme being fully commented upon and the whole of the details entered into. The various



estimates were stated by the respective authors to be as under:—£22,000, by "Economy;" £34,000 by "C. E.;" £50,000 by "Experientia" (not including the purchase of land); £39,345, and annual cost, £840, by "Intermittent Filtration;" £25,915. 2s. 6d., by "Experience;" no sum stated by "Westminster," but £1,050 set apart for the purpose of sewage disposal, the estimated working expenses being £1,110 per annum; £16,300, by "Carefully Considered;" and £24,070 by "Ex Luce Lucellum," showing an annual working profit of upwards of £4,000. It was resolved that the reports should be received, and printed and circulated among the Council and the competitors. Some discussion took place, and eventually all letters on the question were referred to the surveyor; it being also resolved that a copy of that gentleman's report be forwarded to the Local Government Board, together with a letter from the Town-clerk, stating that the matter referred to in the Board's letter was receiving the prompt attention of the Council.

## Building Intelligence.

### CHURCHES AND CHAPELS.

**AUDLEM.**—A new cemetery was consecrated at Audlem, Cheshire, on Wednesday week. The style of the chapels is Early English of the thirteenth century. They are of red brick with stone dressings, interspersed with coloured tile bands, and consist of two chapels, uniform in arrangement, with a vestry attached to each. The interiors are laid with encaustic tiles, of T. and R. Boote's manufacture, of Burslem. The design for the whole (selected by the Board in competition with others) was furnished by Mr. T. Bower, architect, of Nantwich. The work has been executed jointly by Mr. H. Ray and Mr. Jas. Harding. The stone carvings have been done by Mr. Henry Harding.

**BRADFORD.**—The foundation-stone of the new Roman Catholic Church of St. Mary, Bradford, was laid on St. Matthew's Eve. The building will be in the Early Decorated style, and will consist of nave, 121ft. long by 40ft. wide; aisles, 121ft. long by 8ft. (being passages only, the whole of the seating being in the nave); chancel, with an apsidal end, 30ft. by 30ft.; and Lady-chapel, 24ft. by 20ft. The chancel arch will be 30ft. wide and 54ft. high. The nave will be 48ft. high to the plate. The total length of the church will be 155ft., and the width, exclusive of side-chapels, 61ft. The architect of the building is Mr. E. Simpson, of Bradford.

**FISHPONDS.**—On Monday the foundation-stone of a new Primitive Methodist chapel was laid at Fishponds, near Bristol. The new building will accommodate between 300 and 400 persons, its length being 55ft. and width 35ft. It will be built of Pennant stone, with freestone dressings, and will have a wood ceiling with a heavy plaster-covered cornice. The drawings were prepared by the Rev. T. T. Shields; Messrs. Eastbrook and Sons, of Bristol, are the builders, and the contract price is between £1,100 and £1,200.

**THE CHURCH OF ST. DIONIS BACKCHURCH.**—The Ecclesiastical Commissioners have, under the powers of the City Improvements Act, decreed the removal of the church of St. Dionis Backchurch, Fenchurch-street. This church, which was originally built in 1288, and was burned down in the Great Fire of 1666, and rebuilt from designs furnished by Sir Christopher Wren, in the year 1681—contains many objects of archaeological interest; amongst others, a very ancient monument—the costumes painted in colours—erected to the memory of Sir Arthur Ingham; and another to the memory of Sir Thomas Rawlinson, one of our greatest biblioplists and antiquaries, at whose death the sale of his works occupied the whole of twenty-five weeks. In the vestry of the church are preserved four large two-handed brass syringes, which were at one time the only machines used in London for the extinction of fires. The population at the last census amounted to 350 souls, and the living will be affiliated to Allhallows, Lombard-street, to which church the mural tablets, monuments, &c., will be removed.

**WEDNESBURY.**—The new Roman Catholic Church of St. Mary at Wednesbury, was opened on Tuesday. The church is in the Early English

style, the external walls being faced with patent-pressed red bricks, intermixed with bands and patterns of Staffordshire blue bricks, relieved with Box Ground stone-dressings to the windows, outer doorways, &c. It consists of nave and aisles 84ft. long by 43ft. wide, and 50ft. high to the ridge; a chancel, 22ft. 9in. long; chapels; two sacristies; and a tower and spire. Internally, the whole of the stonework has been executed in Painswick stone. The chancel is apsidal in form. On either side, but separated from it by stone piers and arches, is a chapel, one dedicated to Our Lady, and the other to St. Joseph. The architect is Mr. G. R. Blount, of London; and the builders are Messrs. J. Barnsley and Sons, of Birmingham. Mr. J. T. Carew has acted as clerk of the works.

**WESLEYAN CHAPEL BUILDING.**—At the Wesleyan District Meeting held at Liverpool last week, the following cases were recommended to the General Chapel Committee:—A school chapel (part of a larger scheme) at Aigburth Vale, to cost £1,000, exclusive of the purchase of land; a school chapel at Tennyson-street, Preston, to accommodate 200, at a cost of £650; new school-rooms at Wesley Chapel, Preston, to cost £2,700; and a new minister's house in the Wigan circuit, cost £800.

### BUILDINGS.

**BOLTON.**—A new mill for Messrs. Tootal, Broadhurst, and Lee, at Sunnyside, Daubhill, Bolton, was opened a few days ago. The buildings comprise a large weaving shed, and the various rooms necessary for the carrying on of that branch of the business. The total length of the building, which has been constructed by Messrs. R. Nield and Sons, Manchester, from the plans of Mr. G. Woodhouse, architect, Bolton, is 278ft., whilst the width is 235ft. The height of the chimney is about 170ft., and is 14ft. 6in. square at the base, the batter being  $\frac{1}{4}$ in. to every 3ft. The capitals of the pillars at the entrances are of carved stone, and have been executed under the superintendence of Mr. Bennison, at the studio of Mr. Bonhill, sculptor, Brook-street, Manchester.

**CAMBERWELL.**—New baths and wash-houses are projected for Camberwell. The site, which has been already secured, is in every way a desirable one, being in the main Camberwell-road, near the old site of Camberwell-gate, and within a minute's walk of the Walworth-road station of the London, Chatham, and Dover Railway. It consists of a plot of ground at the corner of Brunswick-terrace, and adjoining the Wesleyan Chapel. Here it is proposed to erect a range of buildings comprising five shops with a frontage to the Camberwell-road, two private houses in Brunswick-terrace, and a series of baths, including one large swimming-bath 74ft. by 50ft., and a number of ladies' and gentlemen's private baths, besides laundry accommodation. The large bath will be lighted from above, and there will be boxes for 60 bathers. A spacious gallery will be provided, as in winter time it is proposed to use the bath as a lecture and concert-hall. The architect is Mr. S. Hemming, of Chantray-road, Brixton.

**DUNDEE.**—The Dundee Working Men's Building Company are on the eve of erecting two blocks of concrete artisans' houses superior to any yet erected in Scotland. There will be two rows of houses, standing back to back, with gardens between, and each facing 50ft. streets. The rows will each be 470ft. in length, while the distance from the face of the one block to that of the other will be 146ft., representing the ground covered by the blocks and gardens. There will be 22 blocks in all, each containing 6 tenements, 2 on each floor. The blocks will be three stories high, without attics. There will be twelve blocks of three-roomed houses, and ten blocks of two-roomed houses. Each house has within itself a water closet and scullery, and has appurtenances in the shape of a small garden and coal-house belonging exclusively to the proprietor. The rooms are large and commodious, and much superior to most others in the district.

**MANCHESTER.**—The building in Copeland-street, Manchester, which has been erected for the purposes of the Owens College Medical School, is approaching completion. Externally, the style of architecture, Domestic Gothic, harmonises with that of the Owens College, at the rear of which it is situated. It differs from the college, however, in being built of brick, with stone window-dressings. The medical lecture theatre, 34ft. by 32ft., has separate entrances for

professors and students; and the same arrangement is observed in regard to the anatomical theatre, 43ft. by 32ft., which will seat about 250 students. The building has been erected under the superintendence of Mr. A. Waterhouse, by Messrs. Thomas Clay and Sons, of Audenshaw, the clerk of the works being Mr. S. Harrison.

**MIDDLE TEMPLE LIBRARY.**—The Benchers of the Middle Temple are now engaged in carrying out a series of important alterations and improvements in the general structure of the Library. Ever since the completion of the building the flaws have been a continual source of annoyance, and a number of huge and unsightly iron flues were, a short time ago, constructed and carried across the roof of the library, quite spoiling its appearance. These, after trial, have turned out useless, and now the Benchers, at a cost of £1,000, are engaged in running up new stacks of ornamental stone-worked chimneys, springing from solid buttresses to a height of 27ft. above the battlements, and 3ft. above the ridge. The Reading-room itself is also undergoing thorough reorganisation. Two new stone windows are being constructed at the south-east side. The heating apparatus has been reconstructed, and large coils of hot-air pipes have been placed in each windowledge. The entire operations are being carried out by Messrs. Patman and Fotheringham, under the supervision of Mr. George Weekes, clerk of works.

**MORNINGSIDE.**—The new Midlothian and Peebleshire District Lunatic Asylum at Morningside, N.B., is nearly completed. The architectural features are Italian. The main building, which is two stories in height, consists of a large central block and two extensive wings, the whole presenting a frontage of about 370ft. Parallel with this structure, and connected with it by a one-story range, is another block of buildings, 140ft. in length, facing the north-east, through which passes the principal entrance of the asylum. Accommodation is provided for 250 patients. The roof of the central block is hipped on four sides, and surmounted by a campanile. The estimated cost of the building is about £25,000.

### SCHOOLS.

**EDINBURGH.**—A new school is about to be erected on the South-side district of Edinburgh, by the Heriot Hospital Governors, from designs by Mr. Chesser, their architect. The new building, which is to be two stories in height, will consist of a central block and two side-wings. The style of architecture corresponds in many respects with that of Heriot's Hospital. The leading features of the ground-floor are a row of seven pedimented windows, with ornamented friezes; and the entrance doorways for the two departments of the school, each of which is flanked by pilasters, and surmounted with frieze and pediments. At the terminal corners of the central block, which takes the form of a crowstepped gable, there are corbelled turrets, having ogee-headed roofs with balls and ornamental finials. The gable is to be finished at the apex with a large vase or bust of George Heriot. The total frontage measures about 118ft. The infant school is designed to afford accommodation for 250 children. The boys' and girls' school will accommodate about 400 children.

### CHIPS.

Mr. William Pinney, builder, Bennett Park, Blackheath, was last week summoned to the Woolwich Police-court for building two houses in Pond-road, Charlton, without having previously given notice to the District Surveyor. Defendant, who pleaded ignorance of the law, was fined £2 and costs.

Fisherton Church, Salisbury, is to be enlarged by the addition of a new north aisle capable of seating 210 persons. The cost will be about £2,000.

Mr. William Agnew has offered, on behalf of himself and certain friends not named, to erect a fernery in Piel Park, Salford, at a cost of two thousand guineas. The offer is under the consideration of the Town Council.

The Local Government Board has approved of the plans prepared by Mr. F. H. Fowler, architect, Fleet-street, for the new pauper infirmary at Lambeth.

An appeal is made for funds for the restoration of Kesgrave Church, Suffolk, on the road between Woodbridge and Ipswich.

It is announced that the restoration of York Minster is so far approaching completion that the formal reopening will take place on the 12th and 13th November.



TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

TO OUR READERS.—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

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RECEIVED.—Rev. S. G. jun.—H. (Grimsby).—T. H.—J. B. L.—W. and Co.—H. T. M.—R. P.—P. P. L.—J. C. P. Bros.—A. S.—R. and E.—H. B.—Solomon Setsquare.—G. G. J.—H. W.

W. G. Barrow-in-Furness (The position of the celebrant at the Holy Eucharist is hardly a subject for our columns).—PALEY AND AUSTIN (Block plan to hand).—F. R. (Yes).

Correspondence.

TABLE OF THE TEN COMMANDMENTS.

(To the Editor of the BUILDING NEWS.)

SIR,—Dean Ramsey gives us a Scottish proverb which seems to support that view as to the proper position of the Ten Commandments in churches, to which the Rev. Mackenzie Walcott alludes in your last. "To rye the kirk to theak (thatch) the chancel" (equivalent to "robbing Peter to pay Paul") shows that there is, or lately was, a well-understood distinction between the kirk or nave and the chancel, and the makers of the 82nd Canon may well have used the word "church" as the common term for "nave" in their day.—I am, Sir, &c.,

THOS. BLASHILL.

FARRINGTON MARKET.—At the Court of Common Council, held on Thursday week, Mr. William Lawley moved that the resolution agreed to on the 29th of June last (when only one-third of the members were present), in reference to the erection of New Farringdon Market, on the site adjoining the Meat and Poultry Market at Smithfield, should be rescinded, and that, it being of the highest importance that without further delay a suitable vegetable, fruit, and flower market should be erected within the City, where the buyer and seller should have the greatest convenience, it should be referred to the Markets Committee to consult the Architect, or take other professional advice—first, as to the value of both sites, and secondly, as to the desirability of erecting a high and low level market on the site of the present Farringdon Market—reporting forthwith to the Court. The motion was seconded by Mr. Holland; Mr. Henry A. Isaacs, whose resolution it was that Mr. Lawley desired to rescind, proposed, as an amendment, "the previous question." Mr. T. S. Richards seconded the amendment. After a long discussion, in which all the well-worn arguments were repeated, the Court, by a large majority, adopted Mr. Isaacs' amendment, and thus declined to rescind their resolution. The effect of this vote is to settle, once and for all, that Farringdon Market will not be rebuilt upon its present site, but that a new market will be constructed upon vacant land adjoining the Metropolitan Meat and Poultry Market.

Intercommunication.

QUESTIONS.

[3467.]—Builders' Perquisites.—Is the builder who engages to carry out any proposed new works entitled to use as his own property sand or gravel that he may find upon excavating the site, or does this belong to his client?—W. and II.

[3468.]—Strength of Arch.—Will you kindly inform me the amount of weight a bridge built of grit stone will carry, without fracture, of the following description: Span of arch, 10ft.; segmental arch, 2ft. thick and 2ft. rise; the abutments are 5ft. at the top, and increase to 8ft. above footings.—SUBSCRIBER.

[3469.]—To find Diameter of a Single Acting Pump.—Can a correspondent give a simple and reliable formula for this? Is the following considered correct?

$$D = \sqrt{\frac{G}{\cdot 034 LN}} \quad D = \sqrt{\frac{F}{\cdot 00545 LN}}$$

G being number of gallons to be delivered per minute; F number of cubic feet to be delivered per minute; N number of strokes per minute; L length of stroke in feet; D diameter of pump in inches.—TYRO.

[3470.]—Area of Sewers.—Can a reader inform me what Mr. Hawkesley's formula for area of town main sewers is?—ARISTIDES.

[3471.]—Trap for Sink.—Will any one inform me of the most efficient sink trap in use? I want the most perfect one I can get.—INQUIRER.

[3472.]—Angle of Repose.—I want the correct angles of the "natural slope" of ordinary soil, dry and wet.—Q. P.

[3473.]—Cement Face.—Can one of your numerous correspondents enlighten me as to the best washing surface that will bear a polish? Is Parian the best cement?—R. S. A.

[3474.]—Lattice Girders.—I shall be glad if anyone will inform me how to ascertain the amount of strain produced on the flanges of a lattice girder by a lattice bar carrying a given load and inclined to the flange at a given angle. For example, a lattice bar 8ft. long makes an angle of 50° with the flanges, and is loaded with 14 tons—what strain does this produce in the flange? Should the strain on the lattice bar be  $\times$  by a trigonometrical sign to obtain the strain which is produced in the flange?—G. F.

[3475.]—Woodwork.—Can any of the readers of the BUILDING NEWS give me particulars of any ancient woodwork in some of the smaller unknown churches about London?—G.

[3476.]—Fitch Girder.—Can a correspondent give me a formula for the strength of a fitch beam, taking into account the unequal deflections of the two materials iron and wood; for it is evident the flexibility of the less flexible material determines the deflection of the beam, the wood component receiving little or no share in the load.—G. H.

[3477.]—Japanese Ink.—I have a piece of Japanese ink, genuine imported, and supposed to be something superior indeed, as it cost 15s. I find it is not of the slightest use for architectural purposes; it washes up after use, even after three or four months; it is a brilliant black. Can any one tell me if there is any means of making it available, by using any medium with the ink. Gum does not answer, and is disagreeable to use with it.—DRAUGHTSMAN.

[3478.]—Choir Screen.—I am obliged for answers of Mackenzie E. C. Walcott and "H. R.," in reply to my question. May I ask what kind of choir screens were used, and whether any remains are to be seen? I have noticed the mortices in the stone pillars where screens have been, and these would indicate wooden ones.—ARCHAEOLOGICAL STUDENT.

REPLIES.

[3429.]—Duties of Land Steward.—London's work on "Farm and Cottage Architecture," and Donaldson's work appended to Ryde's "Text-Book," will give all information as to the duties and requirements of a land steward. It is very seldom "G.'s" standard is met with, though unquestionably the duties of a land steward are responsible and onerous on some estates.—G. H. G.

[3437.]—Railway Curves.—Referring to the latter portion of "Engineer's" reply hereon last week, may I trouble him for an example, worked out, showing the way in which he would ascertain the least radius for a siding by his formula, as I do not understand how the third part of the arc is obtained?—G. P.

[3438.]—Lattice Girders.—According to the first part of "Architect's" reply, last week, the greatest strain on the flanges from a distributed moving load will be at the points of support. This is surely incorrect. Does not his formula give shearing strain, and not, as he thinks, strain on the flanges? I have "Molesworth's Pocket-Book," from which the latter portion of "Architect's" reply is evidently copied, but this does not give what I desire. The strains on both flanges of a lattice girder with and without verticals cannot be equal, and "Architect" has completely ignored my remarks on this head on p. 329.—G. P.

[3447.]—Contracts.—In reply to "One in Doubt," the architect's signature is not altogether legal. A disinterested witness is better.—LEX.

[3453.]—Timber Measuring.—The following is the process of bringing the length and diameter of a log into cubic measure:—Take the quarter girth of tree at the middle and both ends in feet; also the length in feet. Then the sum of the quarter girths divided by three, and the result squared and multiplied by the length, will give the cube contents in feet. Allowance is to be made for bark, varying from  $\frac{1}{4}$  in. for thin bark to  $\frac{1}{2}$  in. for thick bark, the deduction being made from each quarter girth taken. It is only necessary in rough calculation to take the quarter girth in the middle of tree, which, squared and multiplied into the length, will give the contents.—G. H.

[3459.]—Strength of Iron Shoe.—In reply to "H. M. H." the effective strength of the shoe he describes will be in the side pocket pieces, which are  $\frac{1}{4}$  in. in thickness, and the fracture of such a shoe would take place in all probability just above the receiving flange; in fact, the latter would break off from the pocket pieces, leaving a great portion of the latter. The resistance in this case would be simply one of tension, and taking effective sectional area, say,  $\frac{1}{4}$  in., I think the shoe should not be subjected to a greater strain than 1 ton. By reversing the position of the side pockets, so that they may be in compression, such a bracket would carry 3 or 4 times as much.—G. H. G.

[3461.]—Eagle Lectern.—The word "aquila" is constantly used in connection with lecterns by the Fathers for the Gospel, but not for the Epistle lectern. De Honecourt shows us, in his Sketch-book, drawings of eagles described as Gospel desks. The use of the eagle form is common during the Middle Ages, and of course the eagle is symbolic, and the origin of the form arose from that circumstance.—G. H.

[3461.]—Eagle Lectern.—In Holy Writ eagle's wings (Exod. xix. 4, Deut. xxxii. 11, Rev. xii. 14) are symbolical of power and swiftness; hence the Book of the Gospel is laid upon them, as though to be borne throughout the world. In a church at Venice (St. John and Paul) the eagle tramples on the dragon.—MACKENZIE E. C. WALCOTT.

[3462.]—Party-Walls.—If the buildings divided by the party-wall are wholly in one occupation there is nothing in the Building Act to prevent openings being made in the party wall, or, indeed, the entire removal of the wall, provided that the external walls, according to their then increased length, are of the thickness prescribed by the Act, and provided that the combined measurement of the buildings does not exceed 216,000 cubic feet.—L.

[3463.]—Notice to District Surveyors.—The employer is not liable if the contractor is a responsible party.—G.

[3463.]—Notices to District Surveyors.—The clause in the Building Act clearly states "if any builder neglects to give notice," &c., "such builder shall for every offence incur a penalty not exceeding twenty pounds," &c. The onus of giving notice, and the penalty for neglecting to do so, being thus thrown on the builder, I fail to see how the employer can be in any way rendered liable for the builder's neglect any more than he would be if the builder neglected to order material in sufficient time and lost money from the men having to wait for it. I usually insert a clause on this subject in the general Conditions.—JOHN WALKER.

[3465.]—Rats and Damp.—I would advise "J. M. D." to pull up the whole of joists and boarding and lay 6 in. concrete, and upon this lay wood-paving  $\frac{1}{4}$  in. thick, bedded in mortar, laid herring-bone pattern. He will find it make a good floor, and will be more suitable for a breakfast-room than asphalt.—G. W. WEBB.

[3465.]—Rats and Damp.—Dig out under the joists and lay with Portland cement concrete or asphalt, or both. Lay new joists and floor, with a space of 12 in. between underside of joists and concrete. Do not bed the sleepers on continuous walls, but on small brick isolated piers. For ventilation, carry down flues outside the external walls, covered with a sloping stone roof 12 in. above the ground, and fix in the vertical faces of the flues, above ground, ordinary iron air-bricks.—L.

[3465.]—Rats and Damp.—Some ten years ago I had a room precisely in the condition described by "J. M. D.," with the addition of a sewer running under the middle of it. I removed the floorboards and joists and substituted an asphalt floor, which effectually shut out the rats, the smell from the drain, and all damp; the room was always dry and sweet, and the only inconvenience felt was from the constant tendency of dining-table and heavy easy-chair to sink uncomfortably into the floor if left too long in one position.—S. F.

[3465.]—Rats and Damp.—I would not recommend "J. M. D." to replace the wooden floor of a breakfast room with asphalt, as that material is non-absorbent, and when the atmosphere is more than usually charged with moisture on a change of weather, the wet will condense on the floor and render it damp so as to quickly rot the carpet. It is also objectionable from a sanitary point of view, being injurious to health by causing the feet to be cold and damp even over a carpet. Laying asphalt over the space beneath, and then replacing the wooden floor, would probably prevent both the nuisance of the unpleasant smell and the rats.



It appears to be a case requiring careful inspection. A similar case came under my notice some time ago. When surveying a house a friend of mine was about to purchase, I detected a very unpleasant smell in the breakfast-room, placed similar to the one referred to by "J. M. D.," and, on taking up a board, I found a considerable quantity of stagnant water beneath the floor, which was afterwards discovered to have leaked from a sewage drain in close proximity to the outside wall of the room. This drain was laid below the level of breakfast-room floor, but above the bottom of space beneath floor. When opened out it was found to have a fall in the wrong direction, and no attempt had been made to render the joints watertight although laid within about 2ft. of the wall and parallel therewith. The previous occupier and owner of the house had been compelled to leave on account of his family's health being so bad. Perhaps "J. M. D.'s" rats have made a connection with a drain, which is causing the unpleasant smell in his case.—JOHN WALKER.

#### WATER SUPPLY AND SANITARY MATTERS.

**HULL.**—The Newington Waterworks, Hull, which were originally intended for supplying the Newington district, are to be enlarged, the late proprietor, Mr. D. P. Garbutt, having entered into an agreement with the Cottingham Board to supply St. John's-wood and Newland, and other parts of their district. A company, with a capital of £70,000, has been formed to work the same, Mr. Garbutt having sold the whole of the works, plant, and fixtures to the new company for £52,000.

**LONGTON.**—There was a public inquiry at Longton on Thursday week, before Major Hector Tullock, respecting an application which the Town Council had made to the Local Government Board for sanction to a proposal to borrow £26,000 for carrying out the sewerage works of the town. A statement was submitted to the effect that the borough was incorporated in 1865. The area was 968 acres, and the population at the last census was 19,747. The total annual rateable value was £48,035. 13s. 9d. The amount of the general district rate, at 2s. 6d. in the pound, was £5,891. 8s. 11d., and the net yield was £5,400. There was a borough rate of 4d. in the pound, making the total amount of rates 2s. 10d. in the pound. The present indebtedness of the borough with regard to loans was £29,325. It was now proposed to sewer the town, and the permanent sewerage works, it was estimated, would cost £26,600. That sum would bring up the indebtedness to £55,925, giving an excess over the rateable value of £7,888. 6s. 3d. At the conclusion the Inspector intimated his intention of recommending that sixty years should be allowed for the repayment of the money.

**ST. NEOT'S, HUNTS.**—Acting under the direction of the Improvement Commissioners, Mr. Thomas Hennell, of London, has lately surveyed this town and locality, with the view of drainage and laying out waterworks. Mr. Hennell's report shows that the estimated cost of drainage is £2,250, while the cost of waterworks will be about £3,000.

#### STAINED GLASS.

**KIDDERMINSTER.**—A memorial stained-glass window has been placed in the Workhouse Chapel, Kidderminster. The subject is "The Crucifixion," and the work has been executed by Messrs. Hardman, of Birmingham.

#### STATUES, MEMORIALS, &c.

**ABRAHAM LINCOLN.**—A statue of Abraham Lincoln, which is to be placed in Lincoln-square, about one mile east of the eastern portico of the Capitol at Washington, is in process of execution at Rome by the sculptor Ball. The subscription for this statue was started by a contribution sent for that purpose by an old slave woman to the United States' Sanitary Commission immediately after the signing of the emancipation proclamation. Congress at the last Session appropriated 3,000 dols. for a pedestal for the statue.

**BATTERSEA.**—A memorial tablet is to be erected at Battersea, to the memory of the late Rev. J. Soule. The design is by Mr. R. Lloyd-Williams, A.R.I.B.A., Denbigh, who was instructed to prepare a design for competition with several London architects, by Mr. S. Horner, sculptor of the Defoe monument, of Abergele, and 27, Ludgate-hill, London, who is the sculptor of this memorial tablet, which is to be paid for by public subscription.

**JOHN BUNYAN'S GRAVE IN BUNHILL-FIELDS.**—The grave of the author of the "Pilgrim's Progress," whose remains lie in the Nonconformist burial-ground, Bunhill-fields, is at the present time in such a state as to cause considerable uneasiness. The recumbent figure of Bunyan is rapidly crumbling away, three-parts of the nose having already disappeared. The two bas-reliefs on the side of the tomb have been subjected to an act of Vandalism scarcely to be credited—for from one of the figures the nose, upper lip, and chin have been deliberately chipped off, and that very recently, whilst from the other the nose has been similarly treated. This monument, which was erected by public subscription, and inaugurated in May, 1862 by the Earl of Shaftesbury, will require complete renovation.

#### LAND AND BUILDING SOCIETIES.

**BRISTOL.**—The 24th annual meeting of the shareholders of the Equitable Building Society was held on Wednesday week at Bristol. From the report and annual statement of accounts it appeared that the total income of the Society up to 31st July last was £157,053. 6s. 6d., as against £142,544. 2s. 2d. in the preceding year.

**CHATHAM.**—The annual meeting of the Second Chatham Permanent Building Society was held on Thursday week. The directors reported the sound position of the Society's finances, which enabled them to pay a dividend at the rate of 6 per cent. for the past year. The directors recommended that the Society should be incorporated under the provisions of the Act relating to Building Societies, which was passed last session. The number of members of the Society was 206, holding 1,010 £50 shares. During the past year 143 new shares had been issued. The profits realised last year were £2,054, leaving, after the payment of all charges, an available profit balance of £1,836. The capital funds of the Society are £23,676.

**HALIFAX EQUITABLE BENEFIT BUILDING SOCIETY.**—The third annual meeting of this Society was held on Tuesday week. The report showed a very satisfactory state of progress, the number of shares having increased from 652 in the first year to 1,719; and the amount of assets from £15,123 to £38,553. The amount of undivided profits was £293. 4s. 5d., which the directors recommended to be apportioned to both investors and borrowers as a bonus of 1½ per cent. on their respective subscriptions.

**SOUTHAMPTON PERMANENT BENEFIT BUILDING SOCIETY.**—The twenty-first annual meeting of this Society was held on Tuesday week. During the past twelve months 148 investment shares had been issued and 176 advanced shares, representing a capital of £8,380. The increase in the funds of the Society during the year was £5,710. 16s. 8d. In seven years the investment shares had increased from 161 to 567, and the advanced shares from 440 to 1,089; and the capital, at the same time, had increased from £14,206. 11s. 1d. to £36,567. 12s. A bonus of £4. 7s. 7d. per cent. was declared, making, with the 5 per cent. previously paid, a return of £9. 7s. 7d. per cent. on the realised shares, and an allowance in proportion to those in course of realisation.

### Our Office Table.

**OPEN SPACES IN THE CITY.**—Last week a meeting of the inhabitants of Broad-street, London-wall, and neighbourhood, was held at Gresham-house, for the purpose of taking steps for the preservation as an open space of the garden belonging to the Drapers' Company in Throgmorton-street. The Chairman said several meetings had been held with the view of preventing the destruction of the garden and the erection of buildings on the site. Notwithstanding the representations made to the Drapers' Company, the trees in the garden had been cut down, and preparations made for forming a road across it from Throgmorton-street to London-wall. Open spaces were necessary for the health of this vast city, and although it had been asserted that the land in question was valued at £15,000 per year for building purposes, the health, happiness, and recreation of the metropolis were of far greater importance. After considerable discussion, it was arranged that the Court of Common Council should be asked to keep up the ground as an open space or recreation ground, and to acquire it, either by purchase or agreement, from the owners.

**REDUCTION IN THE PRICE OF GAS.**—The half-yearly report of the Gas Light and Coke Company says: "On the question of the particular price of gas for the year 1875, it is sufficient to state that the estimates for that year, at the initial Parliamentary price per 1,000 cubic feet, show a probable deficit in the company's profits to the extent of about £40,000, of which upwards of £30,000 will be due to the Insurance Fund. The calls upon this fund having been infrequent, the directors prefer to sacrifice the year's contribution to it; and as the balance of deficiency would not, in their opinion, be of sufficient importance to justify them in demanding and in incurring the cost of another revision of price to meet it, their charge will, in pursuance of the Act, revert, on the 1st of January next, to 3s. 9d. per one thousand feet for sixteen-candle gas, at, and if possible below, which point the directors earnestly desire to maintain it."

**GYPSUM-DIGGING IN SUSSEX.**—While the sub-Wealden exploration has been exciting considerable interest, it is singular that another important investigation, almost on the same spot, viz., a search for gypsum, should have escaped

public attention. The works are situated in the midst of a wood, about four miles from Battle, in a valley through which a small stream runs. On the hill-side nearest Battle, the sub-Wealden boring works are situated, which are now at a temporary standstill. On the other side of the valley is a large wooden structure similar to that in which the boring is carried on, and it is here the requisite machinery for the new work is erected. In order to ascertain how far the gypsum seam extended, a piece of land was bored on Lord Ashburnham's estate, situate about two miles from Battle. At a corresponding depth the gypsum was found, and of the same thickness as that discovered in the wood at Mountfield. When a depth of 20ft. was reached it was found necessary to erect extensive pumping machinery to clear the water and for raising the soil and stone. After digging through the soft soil about 25ft. a large limestone was reached 6ft. in thickness. Below this was a thick seam of hard slaty material which had to be blasted. At the present time five men are employed on the work. The shaft is now nearly 90ft. in depth, and is lowered about 18in. daily. It is over 20ft. in circumference, and is lined with brickwork about 12ft. down. The work, so far as it has gone, is carried out most satisfactorily, and the promoters expect that the coveted mineral will be reached in about two or three weeks' time, provided the work is proceeded with continuously, the depth they expect to go to being 130ft. Considerable interest is manifested in the undertaking. If the gypsum is found to the large extent that is expected, an extensive new field of labour will be opened, as it is believed the seam extends over a considerable portion of East Sussex. Gypsum is used principally for the manufacture of plaster of paris, and the refuse can be utilised as manure for land.

**DECORATIVE ART COMPETITION.**—Mr. Geo. Dobie, of Edinburgh, offers prizes to the amount of £60 for the best designs in Domestic and Ecclesiastical Interior Decoration. The amount is divided as follows: £10 and £5 for the two best drawing-room decorations; £10 and £5 for the two best dining-room decorations; and £20 and £10 for the two best church interior decorations. Mr. Dobie informs us that his scheme has been well taken up, and that he has had offers of extra prizes, which will be added to the list. Seven years ago Mr. Dobie organised a similar competition, which met with considerable success. From a copy of the rules of the competition forwarded to us, we find that the subjects called for are designs for dining-room, drawing-room, and church interiors. Artists and workmen of every nationality are free to compete, and the designs sent in will be exhibited publicly in February, 1875.

**PROPOSED REMOVAL OF TEMPLE BAR.**—On Thursday week, at the first meeting since the recess of the Court of Common Council, the condition of Temple-bar was taken into consideration. Several letters were read containing suggestions for the disposal of the structure; one from a Mr. Ernest Turner gravely proposed that it should be put up on the summit of a new arch; and another advised its removal to the Guildhall-yard. Mr. Lowman Taylor, in moving a resolution, which was ultimately carried, empowering the City Lands Committee to report on the expediency of removing or repairing the existing structure or substituting some similar erection, sensibly suggested that whether a new bar were erected or not, advantage should be taken of the present opportunity to widen Fleet-street at its junction with the Strand, which could be done on the south side at an inconsiderable expense by removing Child's Bank and a few other buildings, and on the north side by a continuation farther east of the improvements inaugurated by the Government in connection with the erection of the new Law Courts. On Tuesday, at a meeting of the Commissioners of Sewers, Mr. Lowman Taylor brought forward a motion, which was agreed to, proposing that it be referred to the Finance and Improvement Committee to consider the desirability of effecting a public improvement in the neighbourhood of Temple-bar, by widening Fleet-street, so as to range in a line with the Law Courts now in course of erection, to confer with the Metropolitan Board of Works, and to report thereon.

**THE PATENT WOVEN WIRE MATTRESS.**—Messrs. Heron, Gresham, and Craven, of Manchester, have sent for our inspection one of their new woven wire mattresses. The mattress consists of a strong fabric of fine wire, tinned, and



stretched on a wooden frame. It is very flexible and elastic, and for ease and comfort, cleanliness and coolness, seems superior to anything of the kind at present introduced. It can be fitted to any bedstead, can be made hard or soft at pleasure, and can be easily taken to pieces and packed in a small compass. For use in hot climates and on board ship it will, we should think, be found especially valuable.

**SOUTHWARK-BRIDGE.**—The Holborn Viaduct, the new Blackfriars Bridge, the new Meat and Poultry Markets, and other magnificent and costly works which have been carried out by the Corporation of London within the last few years, are a credit to the richest city in the world; and it is therefore only the more remarkable that nothing has yet been done to improve Southwark-bridge, so as to adapt it for the reception of a large portion of the traffic which now continually blocks London-bridge. Next Monday London-bridge is to be partially closed for repaving, and then Southwark-bridge will, of necessity, come in for its fair share of traffic; that it does not always get its due proportion from choice is owing to the steep gradient between Thames-street and the centre of the bridge. As a correspondent of the *City Press* points out, Southwark-bridge is the shortest of the bridges, and it connects the centre of the City with the centre of Southwark. On the City side, by way of Cannon-street and Queen Victoria-street, there are already good approaches from St. Paul's Churchyard and the Mansion-house respectively, while the widening of Queen-street (now gradually being accomplished) will afford a good approach from Cheapside and Gresham-street. The approach to the bridge should commence at Cannon-street instead of from Thames-street, and an arch should be carried over Thames-street, as at London-bridge. In this way the gradient could be greatly lessened without any structural alteration to the bridge. On the south side the approach seems to be as easy to Southwark-bridge as to London-bridge. Southwark-bridge-road would accommodate almost any amount of traffic going south, while Southwark-street would take any traffic east or west. A short new street from Southwark-street, passing through "The Mint," and coming out opposite to St. George's Church in the Borough, would make a wide and direct line to Dover-road and the Old Kent-road, and so complete an improvement which would greatly benefit both London and Southwark. When may we hope to see it carried out?

**DWELLINGS FOR THE LABOURING CLASSES.**—Dr. Rygate, Medical Officer of Health for the parish of St. George's-in-the-East, in his annual report (just issued) suggests that boards of guardians should be invested with power to purchase old and dilapidated property, and to erect new and improved dwellings for the working classes. He says:—"Dwellings for the poor might be erected of a better character by placing more power in the hands of an active local or general board, with greater and cheaper facilities for the purchase of property ill-constructed or kept, and the erection on the land of properly ventilated and drained, and otherwise well-constructed edifices, occupying no more ground than those removed, but extending in the only other fit direction, namely, upwards. Such dwellings would let well, and would be a great saving to the rates, as many would have their *amour propre* raised by living therein, and thus be kept off the relief list. Thus a parish could afford to pay a fair price for such property, and be satisfied with a moderate interest. Looking at the subject in a broad view of it, there could be little doubt of this, and with the great local experience of the members of the parochial boards, such purchases might be safely left in their hands. With the knowledge at their command of the value of such property, as seen by the rates paid or unpaid, possibly excused, a fair market value would be easily got at for compulsory purchase. The advantages of such dwellings would be great, both to the inmates themselves as well as to the community, socially and morally, and doubtless physically a better tone would be developed in the London human race. The Londoner would bear illness better when it came, and be less likely to fall ill from ordinary disease."

Columbia Market was formally reconveyed to the Baroness Burdett-Coutts at the last meeting of the Court of Common Council.

## CHIPS.

The foundations of the new church of All Saints, Green-lanes, Stoke Newington, have been commenced. The building, which will be from the designs of Messrs. Dollman and Allen, of Adam-street, Adelphi, will be in the style of the thirteenth century.

A new Wesleyan Chapel is about to be erected at Alverthorpe, near Wakefield, in the Italian style.

The Driffield Board Schools were opened on Monday. The girls' and boys' schools are capable of accommodating 250 children each, and the infant school 200; the buildings were erected from designs by Mr. H. J. Paull, of Manchester.

At Barnsley, on Monday evening, a School of Art in connection with South Kensington and the Mechanics' Institute in the town was formally inaugurated.

Twenty thousand pounds have been given by the Grocers' Company for the addition of a new wing to the London Hospital.

A new school in connection with the United Methodist Free Church, Salford, was opened on Sunday. The school is designed to accommodate 700 scholars, and has been erected at a cost of £2,000.

The Metropolitan Board of Works will hold its first meeting after the recess to-day (Friday) at 12 o'clock noon, at its offices, Spring gardens.

The London School Board will hold its first meeting after the recess on Wednesday next, at 3 p.m., at its new Board Room and offices, Thames Embankment.

A new post-office is about to be erected at Wakefield.

The partial closing of the carriage-way of London Bridge for repaving has been postponed till Monday next.

St. Luke's church, Hanley, was reopened on Sunday week, after restoration.

There are two vacancies in the almshouses of the Carpenters' Company at Twickenham.

Sir Edward Watkin and the directors of the North-Eastern Railway have entered into negotiations with the Corporation of Grimsby for the purchase of 105 acres of the Corporation Estate in the West Marsh, for railway and dock extension.

A most determined attempt at burglary was made last week in Southwark-street, but was fortunately frustrated by the great strength of the safe—one of Chubb's Patent. The mode adopted by the burglars was the "wedging," as used in the famous Caseley robbery; and though for several hours the men were undisturbed, and used great violence, the safe resisted all efforts to open it. Messrs. Chubb and Son have the safe on view at their establishment in St. Paul's Churchyard.

At Freemasons' Tavern, on the 22nd, Mr. Samuel Edmund Waller (son of the Cathedral architect, Gloucester) a young painter of considerable promise, was elected a member of The Artists' Fund.

The Magistrate of the Southwark Police-court on Saturday fined the Phoenix Gas Company 40s. and costs for illegally cutting off the gas from a consumer's premises.

Mr. E. W. Pugin, who was on Wednesday found guilty at the Old Bailey of libelling Mr. J. R. Herbert, was yesterday ordered to enter into his own recognisances in the sum of £500, and two sureties of £250 each, to come up for judgment when called upon.

The Baptist Chapel at Stafford was reopened on Monday week, after extensive alterations and improvements. Mr. Chalmers was the architect, and Mr. Gee the builder.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHELVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB AND SON,  
Makers to the Bank of England,  
57, S. Paul's Church-yard, E.C.  
And 68, S. James' street, S.W.—[ADVT.] } London.

## The Timber Trade.

VERY little business has been transacted during the past week. The stocks on hand are large, and arrivals of wood from all parts are very plentiful.

By the Board of Trade returns for last month, our imports for the eight months ending 31st August, as compared with 1873, were as follows:—

	Eight Months ending 31st August.	
	1873.	1874.
Wood and Timber.		
From Sweden and Norway	433,755	434,997
Russia	170,192	325,611
Hewn { Germany	180,496	237,410
{ B. N. America	180,786	227,834
{ Other Countries	310,051	455,808
Sweden and Norway	315,048	463,156
B. N. America	871,207	1,017,464
Other Countries	396,517	605,125
Staves of all dimensions	122,196	207,478
	45,700	75,946
Mahogany	Tons. 73,786	Tons. 41,860

The current wholesale quotations are as under:—  
Per load of 50 cubic feet.

	£ s.	£ s.
Pitch pine . . . . .	2 15	4 5
Rock elm . . . . .	7 10	8 0
Riga fir . . . . .	4 0	
Baltic crown fir . . . . .	4 5	5 10
" best middling . . . . .	2 15	4 15
" common middling . . . . .	3 10	4 0
" undersized . . . . .	2 15	3 5
Stettin . . . . .	3 0	3 5
Swedish . . . . .	3 0	
" balks . . . . .	2 0	2 10
Ash . . . . .	7 0	8 0
Large birch . . . . .	5 10	8 0
Quebec oak . . . . .	8 0	9 0
" waney board pine . . . . .	5 10	6 10
" small . . . . .	4 0	4 10
" large . . . . .	4 10	6 10
Danzig crown oak . . . . .	5 10	8 0
" brack . . . . .	5 5	
Per 120 12ft. 3 by 9.		
Shediac spruce, long . . . . .	17 10	
" " short . . . . .	15 0	
Per 120 12ft. 1½ by 11.		
Quebec, 1st floated pine . . . . .	20 0	23 0
" 2nd floated . . . . .	15 0	15 10
" 3rd floated . . . . .	12 10	13 0
" 1st bright . . . . .	21 0	26 0
" 2nd bright . . . . .	15 0	17 0
" 3rd bright . . . . .	12 10	13 10
" 1st spruce . . . . .	13 0	
" 2nd . . . . .	10 10	11 10
" 3rd . . . . .	10 10	10 15
St. John's . . . . .	10 0	11 0
Pitch pine . . . . .	14 15	
Petersburg, 1st white . . . . .	3 by 11 12 5	12 10
" 2nd . . . . .	3 by 11 12 0	
Archangel, 1st yellow . . . . .	3 by 11 17 10	
" 2nd . . . . .	3 by 9 17 0	
" 1st white . . . . .	3 by 9 14 0	
Holmsund, 1 & 2 yellow . . . . .	3 by 9 12 15	16 0
" . . . . .	4 by 9 14 10	
" . . . . .	3 by 8 14 0	
" 3rd . . . . .	3 by 9 14 0	
" . . . . .	4 by 9 14 0	
Hussum, 1 & 2 . . . . .	3 by 7 13 10	
" . . . . .	2½ by 7 15 0	
" 3rd . . . . .	3 by 9 14 5	14 10
" . . . . .	4 by 9 14 0	
Gefle, 1 & 2 mix. . . . .	4 by 9 14 10	
" 3rd . . . . .	3 by 9 13 10	14 0
" . . . . .	3 by 7 13 0	
" . . . . .	4 by 9 13 15	
" . . . . .	3 by 11 13 10	
Stockaviken, 1 & 2 yel. . . . .	3 by 9 15 0	
" . . . . .	2½ by 7 14 10	
" . . . . .	3 by 8 14 0	
Christiana, 1st white . . . . .	3 by 9 12 10	
Kotka, common . . . . .	3 by 9 10 0	
" . . . . .	3 by 8 9 10	
Per 120 12ft. 2½ by 6½.		
Dram, 2nd yellow . . . . .	2½ by 6½ 10 10	
" 3rd . . . . .	2½ by 6½ 9 10	
Prepared flooring per square.		
	s. d.	s. d.
Best yellow . . . . .	1½ by 7 20 3	20 6
" . . . . .	1 by 7 15 3	15 6
" . . . . .	1 by 5 13 3	
" . . . . .	¾ by 6 12 6	
Second yellow . . . . .	1½ by 5 12 3	
Second white . . . . .	1 by 7 10 9	11 0
Per 18ft cube.		
	£ s.	£ s.
Memel crown wainscot logs . . . . .	4 10	5 10
" brack . . . . .	3 10	4 5
Riga crown . . . . .	6 0	6 15
" brack . . . . .	4 15	5 0
Per cubic fathom.		
Riga lathwood . . . . .	8 0	8 5
Petersburg do. . . . .	10 0	10 10
Per ton.		
Rlo rosewood . . . . .	14 0	20 0
Bahia . . . . .	12 0	18 0
Bahama satinwood . . . . .	7 0	9 0
Per superficial foot.		
	s. d.	s. d.
Honduras Mahogany, cargo aver. . . . .	0 4	0 5
Mexican . . . . .	0 4	0 5
Pencil cedar . . . . .	0 2	0 3½
Cuba . . . . .	0 4½	0 5
Canadian walnut . . . . .	0 3	0 4
Italian . . . . .	0 4½	0 5
Bird's-eye maple . . . . .	0 5	0 7

## IMPORTS AND EXPORTS OF BUILDING MATERIALS DURING THE EIGHT MONTHS ENDING 31st AUGUST 1873 AND 1874.

Imports.		1873.	1874.
Copper	Tons.	35,774	32,746
Glass (window &c.)	Cwts.	287,369	320,117
" Flint	"	50,219	36,213
" Plate, silvered or not	"	25,283	36,976
" Unenumerated, &c.	"	143,711	197,336
Iron bars, unwrought	Tons.	41,769	44,388
" manufactures	Cwts.	380,985	679,578
Steel, unwrought	Tons.	6,886	2,722
Lead, pig and sheet	"	40,641	43,400
Tin	Cwts.	113,150	112,334
Hewn timber	Loads.	1,275,280	1,661,660
Sawn "	"	1,704,968	2,193,223
Staves	"	45,700	75,946



	1873.	1874.
Mahogany	Tons. 33,786	41,860
Zinc, crude	" 10,146	11,302
" manufactures	Cwts. 150,624	147,163
Exports.		
Copper (foreign)	Tons. 14,208	16,556
Iron, bars unwrought	" 10,792	14,326
Steel, unwrought	" 419	715
Tin	Cwts. 17,537	22,219
Coal, coke, &c.	Tons. 8,309,571	8,910,616
Copper (British and Irish)	Cwts. 468,735	475,797
Glass, plate, &c.	sq. ft. 1,501,078	829,719
" flint	Cwts. 86,349	69,874
" unenumerated	" 82,799	81,711
Iron and steel, pig	Tons. 812,361	457,064
Do., bar, angle, bolt & rod	" 197,716	152,702
Do., hoop, &c.	" 139,125	98,152
Tin plates	" 87,300	78,283
Total of iron and steel of all kinds	" 2,031,197	1,608,953
Lead	" 21,013	27,070
Tin, unwrought	Cwts. 73,427	110,752

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### TENDERS.

**BRKKS.**—For additions to the Junction Hotel, Didcot, for Mr. E. Wells, M.P. Messrs. Drewe and Bower, architects, Margate and London.

Jones (accepted) £220 0 0

**GREENWICH.**—For the erection of new vagrant wards, for the Greenwich Board of Guardians.

Tireman	£4,900 0 0
Martin	4,200 0 0
Lord	4,120 0 0
Hammer	3,898 0 0
Dover	3,895 0 0
Braid and Co.	3,875 0 0
Rudkin	3,874 0 0
Little	3,860 0 0
Brace	3,860 0 0
Kirk and Co.	3,842 0 0
Hill and Higgs	3,820 0 0
Tongue	3,817 0 0
Dickson	3,800 0 0
Weldram	3,786 0 0
Staines and Co.	3,784 0 0
Thomson	3,762 0 0
Crockett	3,612 0 0
Hart	3,580 0 0
Wood	3,490 0 0
Lovell and Co.	3,463 0 0
Loneragan	3,392 0 0
Smith (accepted)	3,172 0 0

**HAMPSTEAD.**—For rebuilding the "Flask" Tavern. Flask-walk, Hampstead, N.W. Messrs. Cumming and Nixon architects. Quantities supplied.

Hill, Higgs, and Hill	£3,468 0 0
Gammon and Sons	3,437 0 0
Downs	3,196 0 0
Carter and Son	2,997 0 0
Hart	2,880 0 0
Cullum	2,795 0 0

**LONDON.**—For alterations and repairs to the Victoria Hotel, Chester-place, Hyde Park Gardens, Messrs. McNab, Soul and Pritchett, architects.

Moreland and Nixon	£588 0 0
Hossowski	515 0 0
Blackmore and Morley	457 0 0
Walton and Son	427 0 0
Temple and Forster	423 0 0

### Bar Fittings

Hill (accepted)	£640 0 0
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**LONDON.**—For the erection of a new Mission Chapel, Tottenham-square, King'sland, N. Mr. H. H. Bridgman, architect.

Knight (accepted)

**LONDON.**—For 3 new shops in High-street, Camden-town, for Mr. Chas. Slade. Mr. H. H. Bridgman, architect.

Knight (accepted)

**LONDON.**—For works at Crookford's, St. James's-street, for the new Liberal Club. Mr. C. J. Phipps, F.S.A., architect, 26, Mecklenburg-square. Tenders accepted.

### General Builders' Work.

Newman and Mann	£1,885 0 0
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### Carton Pierre Work.

Jackson and Sons	370 0 0
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### Plumbing.

Smeaton	170 0 0
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Kitchen Apparatus, Hot Water Supply, Steam Boilers, Baths, &c.

Jeakes and Co.	1,368 0 0
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### Decorations and Painting.

Bell	650 0 0
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### Sunlights and Gaspipes.

Strode and Co.	73 0 0
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### Lifts.

Waygood and Co.	118 0 0
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**MARGATE.**—For branch establishment of the Asylum for the Deaf and Dumb, Old Kent-road, London, S.E. Quantities by Mr. C. A. Gould. Messrs. Drewe and Bower, architects, 12, Cecil-square, Margate, and 110, Great Russell-street, Bedford-square, W.

Bushell and Sons (accepted) £15,000 0 0

**MARGATE.**—For building a hall and offices for the Ancient Order of Foresters, Court Hurlerian, No. 2987. Quantities by Messrs. Gardner, Son, and Theobald. Messrs. Drewe and Bower, architects, Margate and London.

Paramor and Son (accepted) £2,175 0 0

**MARGATE.**—For a convalescent home in connection with the Orphan Working School and the Alexandra Orphanage for infants, for Mr. Joseph Soul, founder. Quantities by Messrs. Gartner, Son, and Theobald. Messrs. Drewe and Bower, architects, Margate and London.

Colls and Son	£2,344 0 0
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Bodew	2,080 0 0
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Paramor and Son	2,058 0 0
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Bushell and Son	1,865 0 0
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**SOUTHAMPTON.**—For new boiler for hot water apparatus at the Hartley Institution.

Lanckester and Son (accepted)	£39 14 0
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**SOUTHAMPTON.**—For repainting exterior of the Hartley Institution.

Mott	£92 0 0
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Corport	91 10 0
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Hall	83 0 0
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Holloway	67 10 0
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Doggrell	67 0 0
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Neal	65 10 0
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Dowdall (accepted)	62 10 0
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**WORCESTER.**—For the reconstruction of Worcester Theatre. Mr. O. J. Phipps, F.S.A., architect.

### General Builders' Work.

Newman and Mann	£2,735 0 0
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Wood and Sons	2,259 0 0
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Wells	2,247 0 0
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Dixon (accepted)	2,000 0 0
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### Other tenders accepted.

### Decorations.

Bell	£250 0 0
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### Act-drop and part of Scenery.

Gordon and Harford	100 0 0
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### Sunlight, &c.

Strode and Co.	65 0 0
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### COMPETITIONS OPEN.

**ARLESEY, BEDFORDSHIRE, Sept. 30.**—For plans for Board schools and master's residence. T. J. Hooper, Clerk to the School Board, County Court Office, Biggles-wade.

**CARDIFF, Sept. 29.**—For designs for the proposed Free Library, Museum, and Science and Art Schools. Mr. E. Payne, Hon. Sec., The Wharf, Cardiff.

**ROCHESTER, Dec. 5.**—For designs for houses to be built on the City Garden Estate. Premiums offered for the best £20 for the second, and £10 for the £30 best designs. R. Prall, Town Clerk, Town Clerk's Office, Rochester.

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### CONTRACTS OPEN FOR BUILDING

### ESTIMATES.

**BOLTON, Sept. 29.**—For the erection of a high level roadway between Deansgate and St. George's-road. Mr. J. Proctor, Town Hall, Bolton.

**BRAMLEY, NEAR LEEDS, Sept. 28.**—For additional out-buildings, yards, &c., at the Union Workhouse. Messrs. C. S. and J. Nelson, architects, Albert-chambers, Park-row, Leeds.

**BRIGHTON, Oct. 1.**—For the erection of a new club house, in King's road. Mr. T. Samson, architect, 170, North-street, Brighton.

**BRIDLINGTON QUAY, Oct. 5.**—For the erection of St. Ann's Convalescent Home and Church. Mr. G. I. Newstead, architect, Consey-street, York.

**CARDIFF, Sept. 30.**—For the erection of police stations. Mr. F. Dalton, Clerk of the Peace, Cardiff.

**CITY, Oct. 9.**—For paving the carriageways of Coleman-street and Walbrook with wood. J. Daw, Clerk, Sewers Office, Guildhall, E.C.

**DUNDEE NEW CATTLE MARKET, Sept. 23.**—Contract No. 1. For the construction of cattle market and roads in connection; and building retaining, boundary, and parapet walls, market-keeper's house, triperies, boiler and blood-houses, cattle-shed, and other erections. Contract No. 2. For the erection of slaughter-houses, lairs, carcass-market, dwelling-house, offices, stables, and other buildings, and constructing sewers, &c. Mr. W. Mackison, Bord' Surveyor, Police-chambers, Dundee.

**DUNDEE, Oct. 10.**—For the erection in concrete of 132 houses at Clessington, for the Dundee Working Men's Building Co., Limited. Messrs. Climax and Sey, architects, 13, Frederick-street, Edinburgh.

**EVESHAM NEW CEMETERY, Oct. 5.**—For the erection of chapels, lodge, boundary walls, &c. Mr. G. L. Eades, Clerk to the Burial Board, The Abbey, Evesham.

**GLAMORGAN, Sept. 30.**—For the erection of police stations at Llantrisant, Pawdy, and Pontllynn. Mr. T. Dalton, Clerk of the Peace, Glamorgan.

**GREAT WESTERN RAILWAY, Oct. 5.**—For driving about 750 yards of 6ft. heading at Portskewet, Engineers' Office, Paddington Station.

**GREAT WESTERN RAILWAY, Oct. 6.**—For the construction of the Bewdley and Kidderminster Branch Railway. Mr. E. Wilson, engineer, 9, Dean's-yard, Westminster S.W.

**HIGH WYCOMBE, Oct. 9.**—For new cottage hospital, outbuildings, &c. Mr. Arthur Vernon, architect.

**HORNCastle, Sept. 30.**—For the erection of two-90, quarter maltings. Mr. R. C. Clitherow, High-street, Horn-castle.

**ILKLEY, Sept. 30.**—For the erection of eight first-class houses in Queen's and Upper Ridding's-road. Mr. G. Smith, architect, 9, Market-street, Bradford.

**ILKLEY, Sept. 30.**—For the erection of a house in Bolton-bridge-road. Mr. W. H. Parkinson, architect, 51, Albion-street, Leeds.

**INDIA OFFICE, Sept. 28.**—For the supply of 100 tons of cake copper. G. C. Talbot, Director-General of Stores, India Office, S.W.

**LANCASHIRE AND YORKSHIRE RAILWAY, Oct. 6.**—For the erection of new workshops at Newton Heath. Mr. W. S. Lawn, Secretary, Manchester.

**MERTON, SURREY, Sept. 29.**—For the erection of three villas. Mr. R. B. Marsh, architect, 16, Mark-lane, E.C.

**MIDLAND RAILWAY, HUNSLY, Oct. 6.**—For the erection of stabling for 25 horses, with straw-shed, and loose boxes. Mr. Austin, Clerk of Works, Wellington Station, Leeds.

**MIDLAND RAILWAY, CALVERLEY, Oct. 6.**—For the erection of a house for the station master. Mr. Austin, Clerk of Works, Wellington Station, Leeds.

**MIDLAND RAILWAY, Oct. 6.**—For the erection of station buildings at Ilmubaston-road, Leicester. Engineer's Office, Leicester.

**MIDLAND RAILWAY, Oct. 6.**—For the erection of a warehouse, in Whitecross-street, E.C. Engineer's Office, St. Pancras Goods Station.

**OXFORD, Sept. 30.**—For the construction of about 3,700 yards of brick outfall sewer, 1,400 yards branch brick sewers, and 9,600 yards of pipe sewers, manholes, &c. Mr. W. H. White, Bath court, New-road Oxford.

**ROCHESTER, CHATHAM, & STROOD GASLIGHT CO., Oct. 7.**—For the supply of about 150 load of Dantzic or Memel fir timber. W. Syms, Secretary, 56, High-street, Rochester.

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**SIR JOSEPH WILLIAMSON'S FREE SCHOOL, ROCHESTER, Oct. 3.**—For the erection of farm buildings at the school Farm, Wouldham. Mr. J. H. Andrews, Medway-terrace, Rochester.

**ST. GILES, W.C., Oct. 8.**—For the construction of about 1,543ft. of brick sewer. Mr. W. J. Trehaarne, C.E., Surveyor, 199, High Holborn, W.C.

**TONG-STREET LOCAL BOARD, Oct. 9.**—For constructing about 4,500 yards of brick and earthenware pipe sewers, with gulleys, gully drains, ventilators, &c. Mr. J. Lumley, C.E., Kirkgate, Bradford.

**WITHERNSSEA PIER, PROMENADE, & GENERAL IMPROVEMENT CO., Sept. 30.**—For the erection of an iron pier with wood deck. F. E. Ayre, 17, Bowdley-lane, Hull.

**WYGESTON HOSPITAL SCHOOL, Sept. 28.**—For the erection of the boys' school in Southgate-street, Leicester. Messrs. Shenton and Baker, architects, Friar-lane, Leicester.

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## THE BUILDING NEWS.

LONDON, FRIDAY, OCTOBER 2, 1874.

## ON LIGHT.

THE arrangement for admitting daylight into a building from the outside must always form one of the leading features in every style of architecture; and as the external light is much more powerful in some countries than in others, the latitude of a place will have a great influence on the characteristics of its architecture. In tropical climates it is necessary to take every precaution for excluding the direct rays of the sun from the interior of a building, and consequently the windows are sheltered by verandahs, and are made more for the purpose of obtaining a free current of air through all the apartments than for the admission of light; consequently they are generally unglazed. In countries just outside the tropics glazed windows are used, but those which are exposed to the sun's rays are carefully protected from them by external blinds or awnings; while in those like our own, which lie further off from the Equator, the windows are placed as much as possible on the sides of a house most exposed to the sun, whose entrance into the apartments is courted rather than hindered, especially in large towns, where there are numerous obstructions to the admission of light, and where the smokiness of the atmosphere reduces its power of illumination.

The "fenestration" or arrangement of the windows of a building is, therefore, one of the most important subjects for the architect's consideration, but is generally regulated by caprice or with a view to external effect, rather than to the actual requirements of the building; so that it often happens that a gloominess is produced in the apartments owing to a want of attention to the best position of the windows, or to the proportioning the window area to the dimensions of the rooms. In the present paper we propose to draw the attention of our readers to some of the points that ought to be taken into consideration in providing proper and sufficient lighting to the rooms of a building.

Various arbitrary rules for the area of window openings in proportion to the size of the room have been laid down, one only of which we shall notice, namely, that the area of window surface shall be equal to  $\sqrt{b, d, h}$ ,  $b, d$ , and  $h$  representing the three dimensions of the room. Thus, if a room is 20ft. by 16ft. and 12ft. high, the area of window by this rule is 62ft., or 8ft. by 7ft. 9in. A window of this size, say 8ft. wide, placed at one end of a room, would generally give light enough, provided there were no obstructions to the admission of the light; the only parts in shadow would be the spaces on each side of the window in the same wall in which the opening is made, which will amount to 8ft. in width, and the side walls of the room will be equally lighted. But if the same area of window opening is made in two divisions on one of the longer sides, there will be a width of 12ft. in shadow; less light will also be admitted in proportion by a narrow window than by a wide one, in consequence of the obstruction offered by the thickness of the wall. Again, if the window is placed with its top near the ceiling, much more light will be admitted than if it is placed lower down. Hence it is clear that such a rule as we have quoted is almost valueless in proportioning the dimensions of the windows to the cubical contents of the room, as their position and the relative proportions of the room must have a great influence on their powers of illumination.

In considering the amount of light to be derived from a window, we need not take any notice of its aspect or the effect of the direct rays of the sun, since these are constantly varying, and when too powerful are

excluded altogether by means of blinds. The light which we have to deal with is the diffused daylight which forms a luminous hemisphere all round us, but of varying brightness, the parts near the zenith giving more light for a given space than those near the horizon. The luminosity of this hemisphere also varies according to the time of year, being three times as great in summer as it is in winter in this latitude, so that an area of window surface just sufficient to illuminate a room in summer would render it very gloomy in winter, and *vice versa*.

A window in a vertical wall may be considered as the centre of a luminous quarter-sphere, provided there are no obstacles outside to prevent the light from reaching the window from every part of the sky; in consequence, however, of the thickness of the wall in which the window is formed, a portion of the light at each side, and also at the zenith, is prevented from entering; the higher, therefore, the window is placed in the apartment, and the wider it is made, the greater the amount of light that will enter in proportion to its area. In town houses there is usually a building opposite which cuts off a large proportion of sky surface from the lower windows; for if a line drawn to the window from the ridge of the opposite house makes an angle of  $45^\circ$  with the horizon, nearly two-thirds of the illuminating power of the sky will be lost, and the window darkened to that extent, so that much larger window openings are necessary in towns than in the open country. Town houses also often have lofty buildings projecting forward on the side at right angles to the plane of the window; if a line from the extremity of such buildings makes an angle of  $45^\circ$  on each side with the plane of the window, about two-ninths of the light is lost, and more in proportion as the angle is increased, one-half the light being cut off from a window by a wall close to it at right angles to its plane.

The greatest possible amount of light for a given area of opening is obtained by means of a skylight or horizontal opening in the roof of an apartment, as the light comes to it from all parts of the hemisphere, and that near the zenith, which is the most powerful, is admitted without hindrance, and has its full effect. Thus the Pantheon at Rome is lighted by a circular aperture in the crown of the dome, the area of which gives about one square foot for every 3,300 cubical feet of space in the building. For picture-galleries and public halls, this mode of lighting from the top is by far the most efficient, as no part of the apartment is in shadow. Next in efficiency to the skylight is the forming of windows in the coverings of the cornice, which method is adopted in some of the galleries of the Louvre at Paris. Vertical windows in the walls of a room give the greatest amount of light according to their nearness to the ceiling; the higher they are from the floor, the further the light is thrown into the room; and if the top of the window is widened, a great increase of light is obtained in proportion to the area of opening, the common mode of contracting the upper part of a window by an arch being very prejudicial to its illuminating power, since the best rays of light are thereby cut off. By splaying the jambs and head of a window, both externally and internally, a considerable addition of light can be obtained, as it is equivalent to an enlargement of the area of the window opening.

The internal decoration of an apartment must always be taken into consideration when determining the size of the windows. If the walls are of a dark tint they absorb much of the light that enters, and consequently a gloomy effect is produced unless the windows are very large; whereas a light colour on the walls reflects much of the light which falls upon them, and adds materially to the cheerfulness of the room, less area of window opening being required in this case to produce the desired effect.

By means of reflection much additional light may be thrown into a window, especially in narrow streets, where no direct skylight can fall upon the windows. If, however, the surrounding walls are kept of a light colour, as is sometimes done by facing them with white glazed tiles or bricks, almost as much light can be admitted as if there were no obstructions and the windows were open to the sky. The law of the reflection of light is that the incident ray which falls upon any bright surface makes with the perpendicular to the surface at the point of incidence the same angle that the reflected ray makes. If, then, we place a plane reflector outside a window at an angle of  $45^\circ$  to the horizon, so as to allow the light from the sky to fall upon it, the rays will enter the window horizontally; or, if placed at  $60^\circ$  with the horizon, the reflected rays will enter the window at an angle of  $30^\circ$  to the horizon; so that by regulating the position of the reflector, the light may be thrown into the window in any direction that may be required, and as much light can thereby be brought into a dark room as would be obtained from a small skylight.

Whenever light falls upon any object a certain amount is reflected, and the rest absorbed or transmitted, so that only a portion of the light which falls on a glass window really enters the apartment, the rest being reflected. Also, when light falls upon a reflecting surface, however bright it may be, a portion of the light is absorbed and lost for the purposes of illumination. Much of the light that might be reflected and serve to illuminate our houses in London is lost by falling upon dark and unreflecting surfaces of brickwork; whereas, if these were kept clean and bright the whole aspect of the streets both outside and inside would be changed, and a great saving effected in the use of artificial means of lighting.

When a uniformly-diffused light is required in a room, ground-glass is generally used for the glazing of the windows or skylights; this reflects about half the light that falls upon it, and the remainder only is available for the purposes of lighting the room, and serves to convert the glass into a luminous surface, from which the light is radiated equally in all directions, its intensity at different points varying inversely as the square of the distance from the luminous surface, so that the light at a distance of two yards is only one-fourth the intensity of that at one yard distance; at three yards it is one-ninth, at four yards one-sixteenth, and so on; consequently the illuminating power is very much less than when the light is admitted through clear glass, and a greater area of window surface is therefore required.

## HOSPITAL CONSTRUCTION.—VI.

## SANITARY DETAILS.

IN our last article we described the general arrangement of the sanitary appliances, lavatories, closets, &c.; we will now allude to some details. We showed the importance of preserving intact the ward proper from its appurtenances by shutting them off by the end wall of ward, and interposing lobbies of communication, separately ventilated, between it and the water-closets, sinks, &c. We also explained how space was obtained for these appurtenances by forming projections at the angles, or, so to speak, projecting the walls at the angles so as to get an end window open to the ward between; the w.c.'s, sinks, and lavatories being ranged along the outer walls. This plan is universally acknowledged as the most advantageous, more efficient than lateral projections, less obstructive to the rows of beds, and, above all, most conducive to health and complete sanitary requirements. It also enables the drains from the closets, sinks, and lavatories to be entirely placed on the outside of the walls, and to divide the drainage into distinct parts, viz., the water-closet and sink drainage, and that for waste from the baths



and lavatories—each department being in a separate angle as we have described.

Another plan may be noticed here equally good in these respects, though somewhat simpler. It is to place the water-closets, baths, &c., in a separate block at the end corners connected to the ward by a short passage, having a window or ventilator on each side. The great and essential principle to be kept in view in designing these conveniences is to isolate them as much as possible, and to separately ventilate the intervening lobby of communication. It is also recommended by Dr. Sutherland and Captain Galton that the superficial area of these compartments "should be no larger than is required for use. Beyond this, all is useless expenditure, and may lead to stagnation of air."

It is hardly necessary to call attention to the necessity of trapping every outlet or waste-pipe before it enters the main soil-pipe, and also that the latter should be placed externally to the walls and be carried up of the same diameter above the roof for ventilation. A charcoal-box or tray placed at the upper end is also recommended as effectual in preventing air-currents from being felt. This latter idea, however, is hardly tenable, as the sewer air is continually being discharged, and as long as this continues, the risk of noxious effluvia cannot exist. We certainly object to the use of small ventilating tubes carried up from the tops of the traps; it would be better to give free external ventilation at each inlet. We have thus seen that the main object is to keep the conveniences entirely distinct as far as ventilation and drainage are concerned from the sick-ward itself. To accomplish this, each should have separate ventilation provided. For the ventilation of the wards, perhaps no plan is more effectual than the provision of a sufficient number of terra-cotta or other gratings about 9in. by 6in., placed in the outside walls at the foot of the beds, and between them with regulators on the "hit-and-miss" principle. It would be best to place these in the thickness of the floors, leading them to the most desirable points of inlet, or conducting the fresh air by chambers or pipes to hot-air boxes or the stoves placed at either end of the room, where the air could be warmed and discharged. Direct air-inlets through the outer walls, however, should be provided in some cases as well, so that a through current of cool air could always be obtained. There are as many ideas among the medical profession as there are buildings. Under one medical man, we find windows open, under another closed; ventilators sealed in one case, and open in another.

For the extraction of the vitiated air of the wards, several plans have been suggested, to which we shall not now refer; the simplest and most effective is to make the flue from the stoves the extracting shaft into which the foul air may be drawn off by gratings or apertures in the ceiling, opening into the hollow plate girders, or distinct horizontal flues. Other more complicated systems are in use, depending in a great measure upon the mode of warming adopted, and which should invariably accompany a thorough system of ventilation, though the two objects have been stupidly regarded as distinct and separate operations. Heating by hot-water pipes has been adopted with success, and a system of heating by a hot-air chamber in basement, communicating by flues in the walls with the wards, the extraction being effected by a draught created by heated chambers in the roof, is another good mode, and is, perhaps, more desirable than hot water. The medical profession appear to be divided upon this subject, but we may infer from the experiments that have been made in France under different systems, and the practice in the best hospitals in our own country, that simplicity is the desideratum, and that the simplest modes are preferred, viz., open or closed stoves supplied with air, or simply warming the atmosphere of ward by radiation.

Now the conveniences should have their own means of ventilation. This can be effected by terra-cotta gratings, as before, leading by flues to grated openings, opening into the water-closets, &c., at their inmost sides, Sheringham's ventilators being placed externally. These are made 13½in. by 6in., so as to bond in the brickwork. By these means separate currents of air are maintained.

Having discussed the main points in hospital construction, it will not be out of place here to allude to some recent expressions of opinion upon the subject of wards. Dr. Michael Beverley, at the late meeting of the British Medical Association, at Norwich, in a paper on "Hospital Hygiene," showed that old hospitals, of good arrangements and sanitary condition, are frequently spoilt by subsequent additions, and rendered less healthy, and this opinion is worthy of attention, and cannot be too forcibly dwelt upon and recognised. Overcrowded hospitals are disease-creating and killing rather than healing, and Mr. Erichsen says "the infection of a pyæmic hospital has to be destroyed by the pick." Septic diseases are acknowledged to be due to bad ventilation and over-crowding, and many of such hospitals are pyæmia-stricken. Dr. Beverley proposes a "series of one-storied separate buildings dotted over the ground; that they should be in sufficient number to admit of one for each sex being kept always empty, so that, after the plan recommended by Billroth, no ward should be used for more than a month or six weeks in succession. The beds should be limited to eight, with two small separation rooms to each for very bad cases, as by so limiting the number, sufficient can be discharged to allow the wards to be easily emptied and filled again in turns, and for this reason also the new patients should be always placed in the ward last cleaned." Separate buildings, in addition, are necessary for any case of erysipelas or septic disease. Dr. Parkes, in his "Practical Hygiene," corroborates this opinion; he says that "the sick should be distributed over as large an area as possible, and each sick man be removed as far as possible from his neighbour; second, that the sick should be placed in small detached and perfectly-ventilated buildings, so that there is no great number of persons in one building, and no possibility of the polluted air of one ward passing into another." Here we have an authority speaking on the subject.

Architecturally regarded, hospitals admit of considerable variety of treatment externally. No less an authority than Macaulay remarks upon this subject, and we cannot do better than quote his words in conclusion:—"To sacrifice the health of the sick to splendour of architectural effect—to place a hospital in a bad air only that it may present a more commanding front to a great public place; to make the wards hotter or cooler than they ought to be, in order that the columns and windows of the exterior may please the passers-by—would be monstrous. But if, without any sacrifice of the chief objects, the hospital can be made an ornament to the Metropolis, it would be absurd not to make it so." These sentiments are entirely in accordance with our own, and express fully, with all the mastery of diction of that great writer, all that can be advanced on this aspect of the question.

#### ANCIENT AND MODERN FURNITURE AND WOODWORK.\*

THE usages and fashions of society are recorded in unmistakable language by the arts which are associated with the daily wants of a people. Architecture stands pre-

\* "Ancient and Modern Furniture and Woodwork in the South Kensington Museum Described, with Introduction." By JOHN HUNGERFORD POLLEN. London: Chapman and Hall. 1874.

eminent as the noblest and most durable reflex of national life and thought. Where written records fail, it often fills up the gap and becomes representative of various arts and handicrafts which the chronicles of historians and poets often fail to give us. Sculpture, painting, and fictile art display the emotional qualities of a nation, architecture its sterner characteristics. There is another branch of art, however, which may be said to take its place between architecture and the arts of the sculptor, painter, and potter. It is that of furniture. At sight of an old chest, cabinet, or utensil, the mind recalls, as by a magical spell, the life of the period which it represents, and one seems to feel an interest in reverting to the history and thought of the epoch which created it. Who, for instance, that wanders through the tenanted apartments of Hampton Court, or finds himself before the relics of Tudor or Jacobean times, does not instantly revert to the Courts of Henry and Elizabeth, or recall a list of names in literature and art associated with the times of these productions? The recollections aroused by some of the works of the Renaissance artists invest them with singular interest, and the collection before us embraces a rich assortment of specimens of furniture, woodwork, and utensils, as chests, cabinets, carvings, &c., belonging to the fifteenth, sixteenth, and seventeenth centuries, and illustrating the Renaissance arts of Italy, Flanders, France, and our own country. But besides the interest of association, there is an equally powerful one in the beauty intrinsically displayed in these objects, and the amount of art-feeling and labour bestowed upon them. We may here briefly scan over some of the numerous examples which the Kensington Museum contains, the principal of which are given in the handsome book before us, published for the Science and Art Department, and described by Mr. Pollen.

Woodwork is, of course, the staple material we have to deal with, and the perishable nature of this material must be assigned as the cause of so few examples coming to us of greater age than the Renaissance. Of antique furniture, the most remote nations are but scantily represented. For Egyptian specimens of furniture we must look to the sculptures on tombs and *bas-reliefs* as the only records of the domestic arts of that people. The British Museum contains a few examples—one of ebony, turned and inlaid with collars and discs of ivory. Sloped backs of carved and gilded framework, and stuffed seats of costly textiles, may be seen, the woodwork and legs being carved variously, representing the limbs of tigers and other animals; couches and ottomans of straight form, and with headboards like our sofas. Pine-wood, palm sticks, cedar, and ebony were used.

The discoveries of Mr. Layard have shown that the furniture of the Assyrians was, in respect of the carving, similar to that of the Egyptians, ornaments of the lion's head and feet, and those of the bull, being common. Metal and wood were used, and, from specimens in the British Museum, incised and carved ivory, gold, and silver, embellished their thrones and couches. Ivory and gold inlays have been found upon their chariots also. A massive rectilinear treatment marks the chairs and couches of these ancient people which may teach modern furniture-makers a lesson; while the ornament is strictly conventional in most instances.

The early ages of Greece borrowed their ideas from the Orientals. The furniture of the Heroic Age was simple. Homer describes tapestries and coloured fabrics. It is to a later age—about the fourth century B.C.—that we must look for real Classic models; but the simple domestic life of the Greeks did not favour much display in their furniture. Their temples and their public buildings exhibited exclusively any sculpture of excellence. The chairs were simple and square in framing, with sloped, and sometimes curved,



backs and legs. The framed seats were in early examples mortised into the legs; sphinxes with lifted wings, lions' and leopards' heads and legs, were employed in the carving. The couches, tripods, state seats, and chariots are depicted on friezes, sculptures, and vases, and many specimens are to be seen in the British Museum. Ebony, cypress, cedar, oak, yew, lotus, and citron woods were used in the carvings, enriched with ivory, gold, and colour. Marble and metal tables are also found.

When we turn to Rome, the splendour of the arts of social life become evident. We have actual examples as well as the literature of the Romans to attest it. Herculaneum and Pompeii bear witness of the furniture which the Romans possessed. Conquest and wealth bought and appropriated all the skill and luxury of surrounding nations, and during the age of Augustus the social wealth of the Roman citizen became proverbial. The sumptuous fittings of the Roman house may be imagined from its arrangements. The open inner court (*cavum aedium*), with its surrounding corridors, and halls screened by tapestries and curtains; their mosaic floors, the dining-rooms (*triclinia*), the sleeping rooms (*cubicularia*), the picture-galleries (*pinacotheca*)—all were finished with the richest woodwork. The doors were hung with hinges and mounts of bronze; the doorposts (*ante-pegmenta*) were enriched with inlays, and carvings, and colour; the *atrium* was furnished with the costliest furniture; the painted or mirrored wall-decorations, ceilings of inlaid work, the *lacunaria*, all displayed the most exquisite art. In the Kensington and British Museums examples are exhibited from which a tolerable idea may be formed of the splendour of the domestic arrangements and social life of the Roman nobles and patricians. Among the specimens and examples of Roman art to be seen in the Bronze-room of the British Museum are bronze tripods, forming the supports of tables and altars of the most chaste design, candelabra, mirror-stands, *abaci*, tables, &c. Roman tables were of the choicest kinds; of marble, gold, silver, bronze, engraved, damascened, plated, enriched with precious metals; wood inlaid with ivory, &c. The supports of wood tables were often of bronze or marble, representing winged sphinxes, leopards' and lions' feet, or architectonic forms. Seneca had five hundred such tables. Horace and Pliny speak of maple as a favourite wood. The bird's-eye was much prized, while many were of cedar on ivory legs. Pollard-grown trees, or the boles and roots, were converted into the planks and discs—the waves and knotty convolutions of grain being in most demand—as the *Cedrus atlantica*. As with us, veneering was employed, and veneers of precious woods were glued on pine or cedar. There were the *Tigrinae* or tiger tables, in which the grain formed waving lines, and the Panther tables (*Pantherinae*), in which it was in spirals. Other kinds were called *Apiatae* (parsley-wood), so-called from the dense masses of grain. Colour was especially valued, that of wine mixed with honey being most prized. Pliny describes the process. The wood citrus was buried in the earth while green, after being coated with wax. Sea-water was used to harden it. Chairs were used, as also reclining couches, by the patricians and their ladies. The *atrium* was provided with couches; so was the *tablinum*. They resembled somewhat our sofas, and were of bronze or precious woods, the latter veneered or inlaid with marquetry or tarsia work of ivory, ebony, palm, bird's-eye maple, beech, &c. Double seats and benches, besides single ones, were used (*sellae*): *curules*, or folding chairs for carrying about, were also employed. Some of these seats and couches were moved from place to place as litters or sedans, while the higher ones had the footstool (*scabellum*), and enabled the occupants to look over the heads of com-

moner people at public shows, &c. Such furniture was sometimes wholly covered with ivory. Turned legs were common, with curved, straight, or curvilinear connecting-rails. Cushions were placed upon the framed top of the *sella*.

The use of chimneys in Roman houses is a doubtful point, though ventilation was obtained by such means. Braziers were used to warm apartments. These stood on legs, and had handles for removal. Examples are seen in both the Museums alluded to.

Cupboards (*armaria*), chests (*arca*), caskets (*canistræ*), for dresses, trinkets, &c., were often of beech, ornamented with metal; others of costly make; and in these was conveyed valuable property on visits, &c. Meals were eaten on couches, and these were large enough to hold three guests. The table tops were movable. Seneca mentions ceilings turned and moved by machinery; perhaps this had reference to coffers or awnings only. The same author alludes to wooden ceilings that could be raised and lowered at pleasure.

For carpentry and joinery cedar was chiefly used; the larch (*Abies larix*, *Abies excelsa*), pine, elm, ash, beech, were also employed in constructive woodwork. For purposes of furniture, the hornbeam (*Zygia*) was much prized for its red grain, *sarsaparilla* also; osiers were used for chairs, as with us. For veneering, the *sectiles laminae* of precious woods, &c., as the citrus, maple, palm (cut across), holly, poplar, tortoiseshell, and ivory, were laid down with glue of excellent quality upon figwood, willow, plane, elm, ash, mulberry, cherry, and other grounds.

The durability of some of these woods is astonishing. The temple of Diana at Ephesus had a cedar roof which was in good preservation for four centuries, and is described by Pliny. The statue of the goddess was supposed to be of ebony, some say vine; the doors were of cypress. Records of remarkable scantlings of ancient timber are found. A stick of fir in the time of Nero attracted notice; it measured 120ft by 2ft. throughout its length; a cedar of sufficient girth to require three men to span the tree is recorded by Pliny (Hist. Nat.), who also asserts that beams of juniper found in his day had been laid 200 years before the taking of Troy.

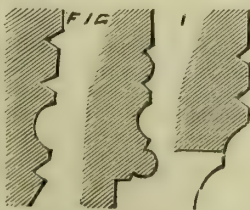
In another notice we will glance at the interesting examples of later and Renaissance times.

#### SOME NOTES OF A MONTH IN NORMANDY.—III.

CAEN is a town where, as I could not stop three weeks, I elected to stay only three days. The dates of the abbey churches, Aux Hommes and Aux Dames, make them at once singularly interesting as archaeological studies, and these alone might well occupy more days than I had to spare for the whole town. Moreover, the days were dull, with wind and rain, and so the interiors were dark, and sketching in the open was impossible. However, from the shelter of a friendly doorway I managed to secure some bits from the charming timber house, No. 94, Rue St. Jean, illustrated in plate 17 of Mr. W. E. Nesfield's Sketches. If a student has time and opportunity, it would be well worth his while to make careful drawings of the details of this front, for they are well preserved, and remarkably simple and effective. Here (Fig. 1) are three rough sections indicating the style of the work. I cannot say I was much pleased with the Renaissance work in this town, for it all reminded me of the vulgar but expressive phrase, "butter upon bacon." No doubt the plentiful supply of an easily-cut stone tempted the workmen to go beyond the

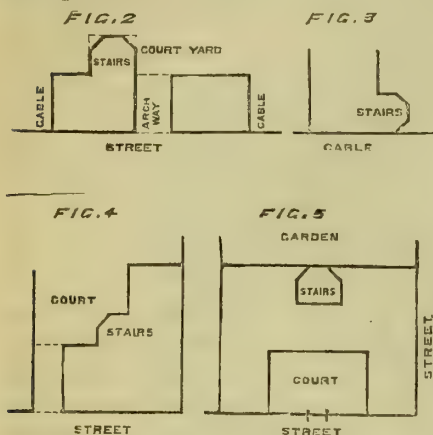
lines of legitimate ornament, and indulge in caprices to an excess that is in some cases painfully bewildering. I confess I did not see much of the ins and outs of Caen, nor can I tell whether I missed much by not doing so. The place had too much of a dull-modern-respectable look on the outside to make one very hopeful of finding much by penetrating deeper.

Bayeux is altogether different. The cathedral, the museum, with its great possession of needlework, and the multitude of old houses ranging from almost cottage proportions to the fully-equipped town-house; the old Norman character of the town, its hilly streets, narrow lanes, old court-yards, and that indescribable quiet so very far removed from dullness that is characteristic of small cathedral towns, all combine to make Bayeux a very pleasant resting place. It has, too, a great advantage over Lisieux in possessing a really good hotel, where, although the prices are maintained at a higher rate than usual, there is every comfort except spring mattresses, and not a few luxuries. The cathedral and the celebrated tapestry having been already well illustrated by photography and otherwise, I contented myself with merely looking at them. The western spires, and the view from the south-east, are things to be remembered. Especially noteworthy is the mass at the base of the north-west spire, where the circular staircase turret is gabled into the broach pinnacle: indeed, the management of the turrets all round the building is extremely good, and those of the transepts are exquisitely subordinated to the leading ones of the apse. The clerestory of the nave is very grand—perhaps, too much so, viewed from the inside; but then the beautiful triforium of the choir will not allow us to dwell long on the defects of the clerestory. Altogether, the general effect, even including the new domical lantern, is that of refined and solemn beauty. In detail the Pointed work generally is, perhaps, over delicate, and at times becomes wiry. The long, thin shafts and continuous mouldings have a weak look about them after Lisieux, and being used plentifully, do not possess the charm of simplicity that pervades the pointed work at Mantes. So also the apse, taken by itself, in spite of its more costly character, is in every way inferior to that at Lisieux. Of the large early-painted *armoire* I have already given an illustration and detailed account in the pages of this journal (see BUILDING NEWS for August 29th, 1873), so that we may now fairly begin our study of the domestic buildings of the town. In style the houses are all Late, and have been erected during the fifteenth, sixteenth, and seventeenth centuries. Some are of timber, but by far the greater number are of stone. The older houses are partly of stone (in the base and stairs) and partly of wood filled in with stone plastered. The later ones are usually of ashlar. In the main streets most of the houses have had their fronts modernised, and, therefore, it is necessary to pass through into the courtyards in order rightly to estimate the wealth of old domestic work this little city of Bayeux possesses. The special feature in nearly all the examples I noted is the turret staircase. This is built as high as the eaves of the main roof, on a semi-octagonal plan; but at this point the canted sides are corbelled over, and there results a square, or nearly square, room, with gabled roof at the crown of the turret, access to which, in the large examples, is obtained by a small newel staircase, corbelled out from the wall of the main staircase turret. Houses in the Rue Franche, Rue de la Cambette, and one near the Cattle Market, exhibit this arrangement very perfectly. In some the staircase does not project beyond the line of the house-wall, but rises out of the roof as an octagon to finish as I have just described. In some of the smaller houses the corbelling is made only just in time to take the gabled roof, and the small room and miniature





staircase are dispensed with. Examples of these different arrangements still exist in a comparatively unmodernised state at No. 12, Rue de la Poterie; at the back of a house opposite the west-end of the cathedral; at No. 37, Rue St. Martin; in the Rue de la Jurisdiction; at No. 6, Rue St. Jean, and at the backs of sundry houses in the Rue St. Malo. The plans of the houses, the position of the staircase, and the treatment of the corbels, vary considerably, but through all there is a striking family likeness. There is one style for the one little community, but each man's house has its own individuality; and this individuality is nearly always expressed in the crowning story of the staircase. I give here Figs. 2, 3, 4, and 5) a few of the block plans.

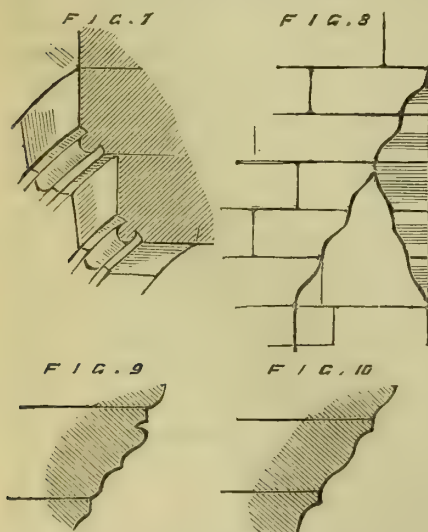


But the most favourite plan is the one I have placed last—

There is a distinction to be noted between the private house and the business house, and it is this, that the entrance doorway of the first is developed into a gateway; for the second, this gateway is usually of two orders, with a segmental arch of from 120 to 130 degrees. The edges of the orders have roll mouldings, and the outer order has scarcely more projection than will suffice to admit the moulding. (Fig. 7.)

Of the corbelling of the staircases, to which reference has been made, the most common form is shown in the sketch. (Fig. 8.)

To this is often added a fillet (as in Fig.



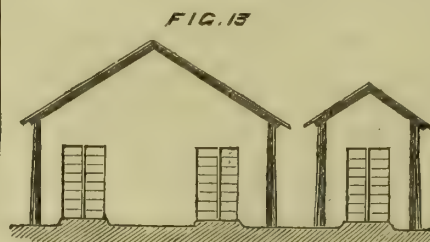
10), and in some cases the corbel is more elaborately moulded, as in Fig. 9. Photolithographs of sketches of two of these little houses will be given hereafter in the series of illustrations now being published in this journal.

E. W. GODWIN.

#### WHITE BRICKS.—IV.

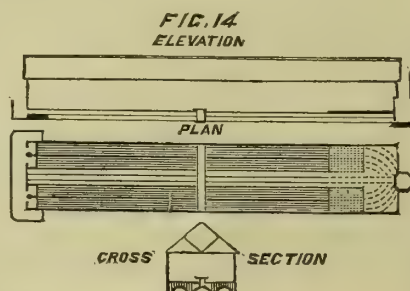
##### REMOVING TO HACKS OR DRYING SHED.

**H**ACKS for drying face bricks (see Fig. 13), should, if possible, be always roofed over with a permanent roof, either covered with thatch or weather-board. They are most economical if arranged to take two hacks, one on each side of the shed, with a passage down the centre. They should be high enough under the eaves to allow of a man reaching over to set his bricks, and the eaves should project well over, so as thoroughly to protect the bricks when the hurdles are fixed in their places on the outside of the hack. A permanent roof for a single hack might be made in a similar manner.



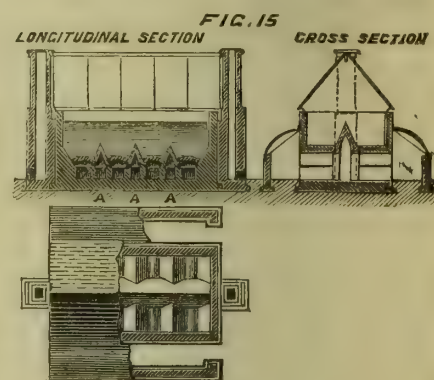
They need not be more than 4ft. wide between the posts. If face bricks are dried in open hacks, great care should be exercised in protecting them from the action of high winds, especially in exposed positions, as the bricks are apt to dry much faster on the windward side, and consequently to curl, which shape they retain when burnt. The bricks should be set very steadily, otherwise they get marked on the face.

The bricks are wheeled to the hacks on off-bearing barrows, each holding 28 bricks, in two rows. These barrows are sometimes inconvenient from their length, and shorter barrows, to carry 21 bricks in three rows are then used. Solid bricks, and plain perforated bricks, may be dried in hacks or under sheds. The mode of drying in sheds differs very much, according to the locality and the nature of the clay. In the north and midland counties, where the bricks can be dried very quickly, they are generally deposited singly upon the floor of the shed and removed and stacked, when sufficiently dry, either in the kiln-shed, or some other convenient covered place. In the West of England, where the bricks require long and gradual drying, the bricks are generally formed into short cross hacks on the floor of the shed. When dry they are removed, and stacked up either in the kiln-pit, or at the cooler end of the drying shed. The forms used for drying sheds differ very much. They generally have a floor over a series of flues about 7in. wide and 15in. deep. Sometimes a large central flue is constructed, as shown in Fig. 14;



at other times a central drying chamber, fitted with shelves. Wall facings, and all moulded bricks requiring particular care, should be dried in sheds. Drying sheds are sometimes heated with hot water. A convenient size is 15 by 25, and 10ft. high to the eaves. Such a shed, if heated with flues, should have a chimney not less than 60ft. high. While speaking of drying, it will be well to say a few words on the subject of

drying the clay previous to grinding. In the summer the whole of the clay required may be dried in the sun if proper care and forethought is exercised in making the necessary arrangements, but in the winter a great deal of auxiliary heat is required. It is very frequently spread over the floor of the drying shed at the fire-hole end, or else packed up round the kilns. Such plans may possibly answer for pipe-making, but will not do for bricks, as the quantity required is so much larger; besides this, a great deal of useful room is lost for drying goods, and the goods themselves are damaged by the steam from the clay. A far better plan is to construct one or more drying kilns, according to the make of the works, of a section shown in Fig. 15 (A A A fire-holes, B B B draw-holes),



Such a kiln is fed at the top, and drawn at the bottom. From 15 to 20 tons, according to size of kiln, may be dried by it in twenty-four hours, with a very small expenditure of fuel, as the fires are kept constantly going.

##### DESCRIPTION OF KILNS USED.

Although very good white front bricks are sometimes burned in open-top kilns, it is better to burn them as a rule in close kilns, for the sake of economy in burning, reduction of waste, and obtaining the bricks of a more uniform colour. If rectangular kilns are used with dead horses, it is better to fire from both ends, and to have three or five holes for any large kiln. Such kilns should have an internal flat crown with a dome round it and above it, prolonged into a chimney. The chimney should always have a damper fitted to it with a chain attached to it, to open and close from the kiln-pit. The space between the flat crown and the dome forms an excellent place for drying moderate quantities of clay. A circular kiln with furnaces round the circumference is, however, still more economical and much more manageable. Such a kiln, called a down-draught kiln, is illustrated and described in the former article on Firebricks. It will save 20 per cent. of fuel, as compared with rectangular close-top kilns, and 33 per cent. as compared with an open-top kiln. The waste in a down-draught kiln from defective burning will not exceed 1 per cent., from a rectangular close-top kiln 5 per cent., and 5 per cent. more from colour; from an open-top rectangular kiln 10 per cent. always for soft bricks, and often 30 per cent. for soft bricks and bad colour. This is occasioned by the heat not being sufficient at the top of the kiln either to burn the bricks hard or to burn off the soot from them. Four small down-draught kilns do not cost so much as one rectangular kiln to hold 80,000 bricks; each of these small kilns may be set, burned, and drawn in 8 days, while it will take a month to do the same with the large kiln. This is of great advantage alone at extensive works, where there is a large sale and quick delivery is required. There is still another advantage to be obtained from these small down-draught kilns, by placing them in groups. The waste heat of one kiln can be made to dry off an adjoining one, and by this means from 1 to 1½ tons of fuel is saved on each kiln.



## CROWDING, SETTING, AND BURNING.

Crowding and setting are sometimes done piecework, at from 9d. to 1s. 6d. per 1,000 for crowding, and 6d. to 9d. per 1,000 for setting. It is much better to do them both daywork, as more care is taken of the bricks, which is very important with first-class facings and moulded bricks.

The removing from hacks or drying-sheds to kilns, commonly called crowding, is generally performed with the usual crowding-barrows. The bricks are sometimes carried on boards on the heads of women or boys if the distance is short, or loaded upon small trucks running on rails if the distance is long. Articles requiring considerable care, as large slabs, are better carried between two men on a mason's hand-barrow. It is better to set white facing-bricks in broad bolts, crossing them with other bolts at intervals, according to the height of the kiln; but the mode of setting depends so much upon the nature of the clay, the amount of pressure the unburned bricks will sustain, the size of the kiln, and other circumstances, that it is impossible to lay down any definite rules. The great thing is to burn with a steady reducing flame, protecting the bricks as far as possible from soot and the small particles of coal which pass over from the furnaces in firing up. The author has found it a good plan to fill the spaces between the bricks in the bolts with fine moulding sand, and to lay a thickness of 4 or 5 in. of sand upon the tops of the bolts. This sand is not wasted, as it can be used over again to set another kiln. The comparative time required to burn various kilns has been referred to above. The usual test by which the burner decides when it is time to burn off is by the settlement of the bricks in the kiln, that is to say, when a kiln of so many feet in height has settled down so many inches, the bricks are considered to be sufficiently burned, and the draught holes can be stopped. This is at best a very rough mode of testing. A far better plan is to form chambers in the side walls of a kiln at various heights, into which trial pieces can be introduced and withdrawn at pleasure. Similar trial pieces should also be placed in fireclay pots or seggars, over the top of the kiln, which can be reached through holes in the crown. A good burner will be able to judge to a great extent when he has reached the proper heat by the colour of his fire. In burning bricks from refractory clays, the smoke is completely consumed for several hours before the kiln is burned off.

**Coal used.**—The quality of the coal used for drying the bricks is not of so much importance. It is better to use a hard coal, large and small mixed. The coal used at Beacon-hill for this purpose was generally Welsh coal, which could be delivered at the works at 17s. per ton. Some of this coal answered very well for burning off, but the quality of it differs very considerably. Some was very inferior, and discoloured the bricks so much that it was discarded, except for drying purposes. The coal found to be the best for burning off at Beacon-hill was the Wylam coal. This was delivered at the works at 20s. per ton, but it was a much cleaner coal than the Welsh coal, giving a longer flame, and a greater amount of heat. It was never found to discolour the bricks in the least.

**Quantity used.**—This of course varies, differing greatly according to the nature of the clay, the form of the kiln, and the state of the weather. It has already been referred to above in speaking of various descriptions of kilns. If all the modern improvements are adopted, refractory clay can be burned with 8cwt. coal per 1,000 bricks; fusible clays, with 5cwt. coal per 1,000 bricks; but in an ordinary way it is considered very satisfactory if refractory bricks can be burned with 10cwt. coal per 1,000, and fusible clays with 7cwt. coal.

**Drawing and Stacking.**—The drawing is carried out with the same crowding barrows with which the bricks are run to kiln. In

kilns which are not arranged to give off their waste heat in cooling down to another kiln, it is better to make an opening from the hatchway into the heart of the kiln in order that the bulk of the bricks may be thoroughly cooled down before they are drawn. If attention is not paid to this point, the faces of white bricks made from strong clays are apt to be full of small cracks which take up dirt and spoil the appearance of the brick.

Stacking is carried out on two principles: 1st. To stack all the bricks from a kiln in one mass, and sell them for one lump sum. When the space for stacking is limited, and the bricks are of an average quality and inferior description this plan may answer. 2nd. The bricks are sorted in stacks according to quality. If space will allow, this is a much better plan for bricks of a superior description. There is often a difference of 10s. per 1,000 between best white bricks and thirds, and no builder will buy a large stack of mixed white bricks except at a very reduced rate.

**Summary of Cost of Manufacture.**—Rubbling 1s. 6d. per 1,000; clay digging and running to clay-heap, 2s. 6d.; sand digging and carting, 8d.; drying clay by heat in winter, 8d.; wheeling to clay-mill and crushing, 1s.; mixing, wetting up, and pugging, 1s. 6d.; delivery to brick tables, 6d.; moulding, 5s.; dressing or hand pressing, 1s.; crowding, 9d.; setting, 9d.; burning, 2s.; fuel, 8s.; drawing and stacking, 6d.; total, 26s. 4d. Saving if made by machine, 2s. 4d. per 1,000.

**Waste.**—This has been referred to above. In white bricks, where the best quality sell at 40s. per 1,000, it may be reckoned for down-draught kilns at 1s. 6d. per 1,000; for three hole housed kilns, with covered tops and inner crowns, at 2s. 6d. per 1,000; for three hole-housed open-top kiln, at 5s. per 1,000. This is so far as relates to actual waste, comprising broken bricks and bricks of which none of the faces are good enough to be used. There is a second waste in quality on the supposition that all the bricks ought to be equally good. Reckoning in the same way the best bricks at 40s. per 1,000, the waste may be taken for down-draught kilns at 6d. per 1,000; for three hole housed kilns, with open tops and inner crown, at 1s. 3d. per 1,000; for three hole housed kilns with open tops, 2s. 6d. per 1,000.

## HISTORIC ART STUDIES.

SCULPTURES OF THE SEVENTEENTH, EIGHTEENTH, AND NINETEENTH CENTURIES.

(With Double-page Illustrations.)

**T**HERE are art-critics who assert that modern art has altogether degenerated. They either dream of trefoils and pinnacles, gloomy crucifixions, painted in black on red, or in dark-green with bright yellow beams on the projecting parts of the bodies and accessories, or they become ecstatic over the Antique, and deny that the last three centuries have had any sculptors at all. These critics misunderstand, or are altogether ignorant of, the spirit of our times. We can do what preceding nations have done, and can do even much more. Instead of building pyramids, we construct tunnels; instead of heaping up huge masses of stones in honour of some mysterious hidden god or goddess, we erect warehouses, throw bridges over large rivers, and hurry at the rate of forty-five miles per hour over dales and the tops of houses. But we have advanced also in art. For one Phidias we have six sculptors in Europe, taking Italy, France, England, and Germany, together, who do not, it is true, surpass perfection, but who attain it; and this is all we may reasonably strive for in art. The power of sculpture did not perish with the Greeks. Through an assiduous study of the ancient Classics, the Greek spirit revived again in the sixteenth century, degenerated in the seventeenth, and brought forth in the eighteenth and nineteenth

centuries masters who stand as equals by the side of a Myron, Skopas, Phidias, or Praxiteles. Our illustrations prove this. We need only mention Canova, the Italian; Flaxman, the Englishman; Thorwaldsen, the Dane; and Schlüter, Schadow, and Dannecker, the Germans. Wherever and whenever the modern spirit of Protestantism did not take a retrograde movement towards the gloomy Middle Ages, the Antique spirit revived in English, Italian, German, or French artists, and produced genuine masterpieces of sculpture or architecture. For Protestantism is Christianity written in the language of the erotic Anakreon, the heroic Homer, and the wise Socrates; whilst Romanism is Christianity written in the language of the casuist Cicero, the dogmatic moralist Seneca, and the sanguinary Emperor Tiberius. The mode of thinking and the art-products of these two sections of the Christian faith differ. Those who profess Protestantism, and work in art forms that are Roman and not Greek, have either had an imperfect education, or they lack talent, and have a tendency to hypocrisy, or at least one side of their brain is not in logical working order. Those who are at heart Romanists, who love the symbolic and mystic, will work in the Roman style or in the Gothic, and produce master-works, because they will give vent to the innermost feelings of their hearts, their spirit will find corresponding forms, and these forms will strike us as true, and truth is beauty. But the art-products of our modern Græco-Romanists, who are aided by our Protestant-Roman Catholics in theology, being inspired by semi-sentiments, are neither wholly modern nor wholly ancient, but failures in every respect, because the genuine spirit of truthfulness, honest integrity, and a consciousness of purpose is wanting in them. The appreciation of beauty is distorted by a morbid tendency to be symbolic or allegorical; but symbols and allegories are forbidden fruit to the true Protestant spirit of modern times; they must, therefore, be cunningly introduced, and this circumstance in itself is a Upas-tree to all art-life. To prevent misunderstanding, it will be necessary to remark that by the Protestant spirit, we do not mean to designate a religious sect. Evangelicals, Roman Catholics, Methodists, Plymouth Brethren, Shakers, Contortionists, and Ritualists, may be Protestants in mind, if they recognise the modern spirit of progressive development in sciences and arts; and they may be bigoted dogmatists, narrow-minded Mediaevalists, and retrogressive falsifiers of our historic period, though they may profess Protestantism, or dissent from Romanism. The Protestant spirit recognises, above all, the rights of nature and the dominion of the highest ideality in art, and therefore, strives for the last possible development in it. The East never could master the form. The Greeks blended form and idea into one, but the modern tendency spiritualises in a true Christian spirit the form, and gives to the correct idealisation of the Greek a higher individual meaning. The Greeks generalised beauty; the real modern artist acknowledges these generalisations in their outward perfection, and applies them to his individual conceptions. The Greeks were, therefore, better sculptors, and we are better painters; this, however, does not preclude our being also excellent sculptors. In considering the pediment of the Town-hall at Amsterdam (see Fig. 1), by Arthur Quellinus, a Netherlander with a Latinised name, a pupil of Fiammingo, whose St. Susanna we have before commented upon (see BUILDING NEWS, Sept. 18, 1874), we find that he works with a modern spirit in the forms of the Greeks. He is undoubtedly more pictorial than strictly plastic; but we may forgive him this mistake for the sake of his noble composition. The base of the triangle measures 82ft. in length, and the height is 18ft. This space is filled up with sea-monsters, Tritons, nymphs, gods, and goddesses paying homage to the



town of Amsterdam enthroned as a comely woman on lions, holding a shield in her right hand; the representative of a commercial Dutch Minerva. The restlessness of the grouping is counterbalanced by the excellence of the treatment of the nude, which is realistic without being offensive. His Diana (see Fig. 2), and a Karyatid (see Fig. 3), are lovely forms. They adorn the interior of the building. The Karyatid, a woman hiding her face in deep grief at having been degraded to the position in which she stands, is one of the happiest compositions, full of deep charm in its very conception.

When some art-critics assert that the Germans and English are without artistic power and taste, they forget that the Germans bled for 30 years on innumerable battle-fields, and had their towns and villages ravaged and burnt for the sake of securing to themselves, and to humanity, freedom of religious thought; whilst the English struggled to attain political freedom for themselves and all men. Under such circumstances one cannot be astonished that the artistic spirit in the two branches of the Teuton family in Europe appeared to progress slowly, or to be altogether exhausted. Scarcely had the Brandenburger elector gained, religiously and politically, a free footing, and found a spot on which to build a capital, when arts began to revive. Andreas Schlüter, born at Hamburg, 1662, when barely thirty years of age was summoned to Berlin to work as sculptor, and later also as architect. The plastic decorations of the arsenal, built by Nehring, are his, as also the ornamental sculptures of the Royal palace and the grand equestrian statue of the elector, Frederic William the Great, erected for King Frederic I. of Prussia. The military spirit of Greece pervades the works of this powerful genius. Trophies are arranged by him in a proud spirit of conquest. The bronze statue of the Elector looks like that of a Roman emperor, in spite of his Teutonic earnestness, and Protestant soberness (see Fig. 4). His bas-reliefs of Strength (see Fig. 5), and of Europe (see Fig. 6), proclaim loudly, in daring forms, that a new spirit of freedom has begun to inspire arts and sciences. Most characteristic is the allegory of Strength. A lion reposes, with widely open eyes; against him leans a beautiful and classically draped woman, armed with a heavy club, which a charming genius, young in years, small in stature, tries to lift. Prophetically the artist saw the future of the recently born genius of modern times, and he was not deceived in his vision. Twenty-one heads of dying warriors adorn the arsenal. Schlüter has with admirable skill and great effect composed these Teuton gladiators, who bled for freedom and the purity of faith, and not for the amusement of the wild rabble in a Roman circus. The heads adorn the finishing stones of the windows. We give two of them (see Figs. 7 and 8). Though we object to petrifications of horrors, and faces distorted in death, we cannot but acknowledge the great skill with which the artist has succeeded in idealising an objectionable subject.

We give three more specimens of French sculpture to complete our illustrations of French art during the seventeenth century. The subjects are characteristic of the Gallic spirit. The realistic element of sensationalism, though somewhat softened down by a more careful study of the Antique, still prevails. A theatrical mannerism and a predilection for attitudinising are unmistakable ingredients of French sculpture. The Rape of Proserpine (see Fig. 9), by Girardon, after a design by Lebrun, executed to ornament the park at Versailles, under Louis XIV., is a natural outgrowth of the wretched moral and æsthetical state of society. Voluptuous outline, wild imagination, and grand composition, distinguish the Rape of Orithyia, the daughter of King Erechtheus of Athens, who was carried off to Thrace by Boreas; the work of Gaspard de Marsy and Anselm Flamen (see Fig. 10).

François Anguier has given us a charming woman, representing Justice (see Fig. 11). This work is highly distinguished by simplicity in the composition and a refined classical taste in the execution. The figure holds in her left a shield adorned with the portrait of Count Offremont. The work is in the Church de l'Oratoire at Paris. French art-critics are not decided whether it is the work of François Anguier or his brother Michael.

In turning to the sculptures of the eighteenth and nineteenth centuries, we can mention a few names that shed lustre on the art of modern Europe, and put to shame those imbecile art-historians who abuse everything that cannot be dated two thousand years back. Foremost in the ranks of our modern sculptors stands Canova, as representative of the South; and Flaxman, as the incarnation of the Northern genius. Both are offshoots of the Antique; but they are as original as Phidias in comparison to Myron, as Skopas in relation to Phidias, or as Michael Angelo with reference to Alkamenes or Anthenodoros. Canova very early saw the necessity of deviating from the set rules of art, which gave proportion in dry figures, measured heights and breadths, and treated the creative genius as if it were to solve a mere geometrical or algebraic problem. He resolved to explore those paths which led the ancients to perfection and beauty, and determined to give up low realism and a mere reproduction of nature. His superfluous time was spent in the gallery of plaster casts of the Commendatore Farsetti, containing specimens of nearly all the celebrated remains of antiquity, and thus he became one of the greatest sculptors of all ages. He had a profound contempt for all petty conventionalism, and sought to understand the lofty spirit that animated the works of Greek art during its best period, uniting grandeur of idea with truth of form. When he went to Rome, he found in the galleries of the Vatican ample materials for study. A change began to take place in the study of Arts. The modern spirit of inquiry into the Classic past, roused practically by Michael Angelo, took a systematic, but not pedantic, form. The Marquis Tanucci, at Naples, encouraged a right appreciation of the antique. The Popes Benedict XIV., Clement XIV., and Pius VI. afforded every facility for the study of Classic art; proving themselves to be more deeply influenced by the flow of modern thoughts than many a "Mediævalising" Protestant architect of the present day. The works of Visconti and Winkelman, of Sir Wm. Hamilton, and Hancarville, were not merely looked at by Canova, or neglected for the sake of eccentric diatribes full of whimsical originality on "nature," but were conscientiously studied. The masterly intaglios by Pichler, the reviver of this art, and the fine and bold designs of Flaxman, had an immense influence on our modern Phidias. Wherever a genial artist emerges from obscurity, soaring high above his times and nation to immortality, he does so always at a period when learning and hard study, love of the ideal, and a refined culture of the mind are the prevailing elements of the society in which he moves. Thus Canova was able to destroy conventionalism and a coarse realism through an honest appreciation of nature, and its genial idealisation not merely revived, but continued to display the eternal laws of æsthetics in his works. In the spirit of generalisation, strongly marked by a powerful individualisation, is his masterly statue of Clement XIV. (see Fig. 12). This is not Giovanni Antonio Ganganelli; it is the ideal of the Father of Humanity. It is a benignant Jupiter smiling in Christian love on his children, represented as enthroned, stretching out his right hand and blessing the Universe. On either side of the Pope are the allegorical figures of Moderation and Innocence. In these two conceptions, as also in the masterly representation of Italy mourning at the tomb of her favourite poetical genius Vittorio Alfieri (see Fig. 13), we possess

the very best specimens of Christian sculpture. Moderation, Innocence, and Italy, if women, could only look as the artist must have seen them by the bright light of his imagination, whilst his hands mechanically reproduced the reflections of his divine fantasy. His group of Adonis and Venus (see Fig. 14) ranks as high as the very best Classical productions of antiquity. The figure of Venus is full of ideal gracefulness, the action of her hand touching the cheek of her lover is most touchingly natural. The softly-flowing lines of this composition are equal to those of the Venus of Milo, and surpass anything left us by the chisel of Praxiteles. Adonis, a beautiful figure, appears to be anxious to leave his love; he throws his arm round her, and takes a parting glance. But his embrace is cold, his look weary, he thinks already more of the pleasures of the chase; whilst the woman looks at him with all the intensity of passionate gratitude, still feeling boundless love for him. The group is not only an artistic masterpiece, but an admirable psychological essay. It was destined for the Marquis Berio at Naples, and was at a later period retouched by the master; it is now in the possession of M. Favre, at Geneva. In quite a different style, powerful in composition, grand in every line, was his statue of the immortal Washington (see Fig. 15). The founder of American Independence was represented in the garb of a Roman senator, trampling under foot a sheathed sword, signifying the successful termination of the war. The hero was seated gazing with meditative looks into space; he appeared ready to write on a tablet laws best fitted to promote the freedom and happiness of his countrymen. The statue was only slightly larger than life, but was unfortunately destroyed by fire. We may learn from Canova how to blend Classic ideality with faithfulness in portraiture. The likeness of Washington was perfect; the facial lines were animated by dignity, gentleness, and benevolence. The works of Canova are so numerous that they appear to have been the labours of a whole race of artists, and yet all of them bear the stamp of mighty genius. "The fury of Hercules hurling Lichas into the sea; the noble and heroic air of Theseus, in the act of slaying the Kentaur, the various characters of Hector and Ajax; the pious figure of Clement XII.; the deep affliction in the family group at the tomb of the Countess D'Haro; the lofty courage of Kreugas; the fell expression of Damoxenus, the mild dignity of Washington; the deeply-impassioned group of Piety," were all executed in a different character, but were never slavish copies of the Antique, and are generally impressed with the perfections of Classic art. Canova's influence was immense on the improvement of sculpture in Europe. The degenerated style began to fade more and more, and a new spirit of purity and taste invigorated the Classic art. The French sculptor Antoine Denis Chaudes was one of those who freed themselves from the fetters of a coarse realism and over-refined mannerism. His statue of Cincinnatus (see Fig. 16) has great merits; though it is cold and too academical, it is at least free from all vulgarity. The dictator, a manly figure, stands meditating by the side of his plough. Tunic and toga are worthy to be studied for the simple and unaffected treatment of the drapery. In England John Flaxman raised sculpture to the greatest perfection. All that we have said in praise of Canova may be repeated of Flaxman, who devoted himself with indefatigable earnestness to the study of the Antique. He spent seven years at Rome, not making money, but studying the art-treasures of the Eternal City, as Canova did in London; the latter confessed that after a careful study of the Elgin marbles his style greatly improved. We are sorry to find that Flaxman has been more appreciated abroad than in England. His love



of the Antique was considered too heathenish. Homer, Æschylos, and Dante were not much read or known; Flaxman's genius in illustrating these giants of poetry soared too high to be popular. We give a relief illustrating the words from the Lord's Prayer, "Thy Kingdom Come" (see Fig. 1). A beautiful woman with chaste, delicate, and admirable outlines, strives to embrace two angels, whilst charming children support the exquisite drapery, which is rather too theatrically arranged. The relief is from a tomb erected to the wife of Sir Francis Baring, at Mitcheldever (Hampshire). To say that Flaxman was "in poetical feeling and invention as superior to Canova as Shakespeare to the dramatists of his days" is one of those childish outbursts of national self-laudation against which we cannot too often raise our voice. Nothing is more dangerous to a normal and healthy progressive development of art than self-glorification; it leads to a guilty neglect of the study of the art-products of other nations, and a mimicking of our great men, without striving for originality. How absurd would it appear if a foreign art-critic were to say Dannecker stands as high above Flaxman as Goethe above Tom Taylor. Dannecker has great merits, he is more realistic than either Canova or Flaxman, but his Ariadne (see Fig. 18) is undoubtedly a statue of which no Greek sculptor of the best period need have been ashamed. Not less excellent was the rather stern and energetic Shadow, uniting Classical simplicity with a decided naturalism. We give a relief from the tomb of the young Count von der Mark in the Church of St. Dorothea at Berlin (see Fig. 19). The three Moiræ are of great ideal beauty; whilst his Frederic the Great (see Fig. 20) is as masterly as Canova's Washington, only more realistic. "Every inch a king," may be said of Shadow's statue, and still all the genial qualities of the greatest "demagogue in regal robes," his penetrating intellect, his unbounded sense of justice, and kindness of heart, are well given in this sculptural portrait.

We conclude this study with two specimens by Thorwaldsen, and trust that in future we shall hear no more complaints that our age is bare of art and artists. We praised both Canova and Flaxman, and must no less admire Thorwaldsen, for he had the genius of Canova, the refined delicacy of Flaxman, and all the great merits of a Classically-trained taste. He may be said to be the purest and most powerful representative of Antique sculpture in our time. He far surpassed the ancient masters in the variety of his subjects, for he was able to treat the most sacred forms of Christianity with the utmost ideality and naturalness. The colossal statue of Christ, 10ft. high (see Fig. 21), is both in conception and execution, grand, elevating, and perfect. No attempt to represent, in realistic vulgarity and a low degraded spirit, the merely accidentally human specialities in Christ is seen here, but the divine ideality of Our Saviour is rendered with masterly power. The triumphal entry of Alexander the Great into Babylon, of which we give a fragment, with the victorious Alexander in the centre (see Fig. 22), is in the spirit of the Panathenaic procession from the Parthenon. It was composed to decorate a room in the Papal palace on the Quirinal, by order of the Emperor Napoleon I., and modelled in three months. It was afterwards executed in marble for a villa of the Count Sommariva on Lake Como, and a second copy adorns the Thorwaldsen Museum at Copenhagen, from which we possess, through the kindness of the Danish Government, an admirably executed cast in the South Kensington Museum.

G. G. ZERFF.

By the Metropolitan Street Improvements Act, 1874, which relates to the taking by the Metropolitan Board of Works of a piece of land comprising a portion of the parish-church of St. Mary, Newington, and a portion of the churchyard, the time for taking the same is extended for three years.

#### THE WANDSWORTH DISTRICT.

WE have just received the eighteenth annual report of the Board of Works for the Wandsworth district; also the report of the medical officers of health on the sanitary condition of the several parishes comprised in the Wandsworth district during the year 1873. These reports (which come to hand very late, the former being for the year ending March 25 last, and the latter for the year ending 31st December, 1873) chronicle a vast amount of useful work accomplished or commenced. The Wandsworth district comprises the parishes of Battersea, Clapham, Putney, Streatham, Tooting Graveney, and Wandsworth, which are collectively represented by a Board of Works numbering eighty members. The officers of the Board include five surveyors, viz. one for Battersea (Mr. John T. Pilditch), with a salary of £300 per annum, and office; one for Clapham (Mr. Arthur Southam), with a salary of £300 per annum and office; one for Putney (Mr. Joseph Niblett), with a salary of £275 per annum, and residence; one for Streatham and Tooting (Mr. James Barber), with a salary of £340 per annum; and one for Wandsworth (Mr. Anthony Dobson), with a salary of £340 per annum. There are also six medical officers of health, each receiving £50 per annum; an analyst under the Adulteration of Food &c. Act, who is paid 5s. for each analysis; two inspectors of nuisances, &c., besides a clerk and assistant clerk, receiving respectively £400 and £300 per annum. Altogether the Board seems very well organised. During the year embraced by the Report of the Board there have been very few new sewers constructed within the district. In Clapham about 2,230 lineal feet of pipe sewers have been constructed in new roads, and in Streatham and Tooting about 3,767ft. of new sewers have been constructed, together with about 1,028 lineal feet of pipe drains for filling-in roadside ditches, &c. 277 private drains, from 4in. to 15in. diameter, and with an aggregate length of 6,175ft., have been constructed by the Board. Among the nuisances abated at the instance of the Board may be mentioned that of the dustyard adjoining the waterworks at Nine Elms. Another nuisance which the Board has taken legal proceedings to suppress, though without success, is an open ditch on the Priory Estate, Roehampton, which receives the drainage from Dr. Wood's lunatic asylum. The total length of roads now under repair by the Board is 99½ miles, and during the year 24,273 cubic yards of road materials were used, including Kentish flints, Kentish rag chippings, stone gravel, fine gravel, Guernsey granite, Guernsey granite siftings, Bombay stone, Port Philip stone, hard core, Enderby granite, pit flints, sifted gravel, and hand-picked surface flints. Barnett's asphalt and Wright's tar-paving, particularly the latter, have been used rather extensively in the district. Road-watering cost the district £4,210. 2s. 6d. During the year 534 houses, 39 additions, 51 stables, 19 warehouses and shops, and 9 churches and chapels, making a total of 652 buildings, were erected in the district. The Board opposed, unsuccessfully, a proposal of the Wimbledon Local Board for constructing certain works for the purification and utilisation of their sewage on land adjoining the Wandale, and near to the boundary of the Wandsworth district.

The sanitary condition of the district is entered into very minutely in the report of the medical officers of health. This appears to be, on the whole, satisfactory, and shows a favourable advance on previous years. With reference to the long-promised "constant water-supply," the report says: "So many differences of opinion have yet to be reconciled between consumers and some of the companies as to what are 'prescribed fittings,' that much litigation appears inevitable before any great advance can be made in the realisation of the promised boon. New neighbourhoods, where numbers of new houses are constantly springing up, may possibly get a constant supply earlier than old and poor localities; but it is feared the Legislature will find it necessary to interfere to enforce the new system on both the public and the companies before a high-pressure service can be brought into anything like general use. Local authorities, it is submitted, should combine to effect that which some powerful companies appear bent on postponing so long as the patience of the public will permit them." In Battersea East the numerous sanitary works carried out by the Metropolitan

Board of Works and the Board of Works for the Wandsworth District in the way of drainage, road-making, paving, &c., are said by Dr. Kempster to have completely changed the sanitary aspect of the locality, by drying the soil, and altering the "water-logged" condition which formerly prevailed. The medical officer for Battersea West (Dr. Oakman), after referring to the numerous complaints made of the effluvia escaping from the sewer gratings in the streets, urges the destruction of the sewage gases by passing them through factory or other furnaces—a plan which has long since been shown, by Sir Joseph Bazalgette and others, to be futile. Sewers cannot be ventilated in the same manner as mines, and it is surprising to find medical officers of health so devoid of information on a point which by sanitary engineers is now generally accepted as established. Dr. Oakman very properly urges the erection of a mortuary in his district, but ventures on more debatable ground when advocating cremation. In his concluding paragraph on this subject, he says that "when it is realised that matter is indestructible, and that the elements of the body still exist, but in other combinations, whether the body slowly but noxiously decomposes after burial, or quickly, but safely, as in burning, the prejudices against cremation will gradually subside." Dr. Harland-Whiteman, the medical officer of health for the Putney and Roehampton district, refer to the judgment lately pronounced by the Court of Queen's Bench in respect to the making up of the first roads and footways of newly-formed streets. Hitherto, all has been confusion and doubt with regard to the bearing of the law upon such disputed matters, and hence many owners of new house property, relying too much on the voluntary action of Boards and Vestries to relieve them of the first cost of road-making, &c., have so neglected their approaches as to constitute them nuisances of the very worst description. As Dr. Whiteman points out, the absence of good approaches to rows of newly erected dwellings is doubtless often the cause of their failing to attract suitable tenants. To build houses, and to render them approachable only through mud and filth, is surely a mistaken policy, and by the recent decision of the Court of Queen's Bench, the local authorities are invested with the power, in the event of the neglect of the owners, to execute works of both drainage and paving in new streets, and to charge the owners with the costs.

#### RED RIVER LIMESTONE.

THE first exposure of Limestone of Silurian age was (see Exploration of the Settlement, published by order of The Legislative Assembly, Toronto) seen just below the Stone Fort, Red River. It here crops out in massive layers. The colour of its weathered surface is a pale yellowish grey, and of fresh surfaces, a grey more inclined to white; it is hard, but its fresh fractures are not clean. It makes a good building material, and is extensively used for that purpose. The lower or Stone Fort is constructed from the bed which crops out on the river bank beneath it. The rock is highly fossiliferous. The second exposure was seen about two miles below the Grand Rapids. In both instances the surface was irregularly-inclined, and so nearly horizontal that it was found impossible to ascertain the dip. The most general inclination appeared to be very slightly towards the south west by west, but other exposures not far removed showed, it was thought, a perceptible inclination in the opposite direction. Whenever seen on the Red River, the rock is highly magnesian, and often contains small embedded masses which appear to hold magnesia in greater proportion than lime. About nine miles west of the Middle Church, Red River Settlement, at a place locally designated "Stony Mountain," cliffs of limestone show a bold front, facing the west, with an altitude of about sixty feet above the prairie. The layers of rock are nearly horizontal, very massive, and building materials to any extent are here easily accessible.

On Tuesday week a public meeting of the rate-payers of Heywood was held for the purpose of sanctioning or rejecting a scheme submitted by the Local Board for the erection of a market and public offices. The motion that a market and offices be built at a cost of £10,000 was carried almost unanimously. It was then moved and carried that, in lieu of offices to be let, the Board be requested to provide a large assembly-room at an extra outlay of £4,000.



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## OUR LITHOGRAPHIC ILLUSTRATIONS.

## ADFORTON CHURCH.

THIS small church has been just commenced in a district of the parish of Leintwardine, in Herefordshire, from the designs and under the superintendence, of Mr. John P. Seddon, of 1, Queen Anne's-gate, Westminster. Mr. Ingham, of Leintwardine, is the builder, his estimate for the nave and porch, which has been accepted, being £694. 15s., and for the whole church complete £964. 15s. It contains 150 sittings, provided by chairs in the nave and stalls in the chancel, and consists, as shown in our illustration, of a nave and chancel, with apsidal termination, a south porch, vestry, and bell-turret. The furniture, stove for warming, &c., are included in the respective estimates. The material of the walling is the local stone, and the roof is to be covered with Broseley tiles. The foundation-stone of the church was laid on the 17th ult.

## WESLEYAN CHAPEL, NEW WORTLEY, LEEDS.

Our illustrations this week include a set of drawings, by Mr. Henry Walker, architect, of Leeds, and submitted last July in competition for a new Wesleyan Chapel proposed to be built in one of the out-districts of Leeds. The drawings explain themselves; but it may be mentioned that the structure is designed to accommodate 931 persons, and to be erected of red brick, with local stone dressings sparingly used, the internal fittings being of red deal stained and varnished.

## LISIEUX CATHEDRAL.

Some details of Lisieux Cathedral are given this week, drawn by Mr. E. W. Godwin. They will be found fully described in his article, "Some Notes of a Month in Normandy," on p. 308 *ante*.

## SCULPTURES OF THE SEVENTEENTH, EIGHTEENTH, AND NINETEENTH CENTURIES.

For description of illustrations of Sculptures of the Seventeenth, Eighteenth, and Nineteenth Centuries, see Dr. Zerffi's article, "Historic Art Studies," on p. 397.

## NEW CHURCH OF ST. COMGHALL, STRABANE.

The following are a few particulars of this church, which we illustrated last week: The Building Committee of the proposed new Episcopal church, Strabane, advertised that they wished a competition, and ultimately selected the design illustrated. Local rubble will be used, with free-stone dressings. The church will seat 400 people, exclusive of choir. The passages will be laid with red and black tiles, and the chancel with encaustic tiles. The pews will be of pitch-pine, open, and three feet from back to back. The roof inside will be plastered on the back of the curved ribs under the principals, so as to form a pointed barrel, with the ribs exposed and varnished. The Committee hope that the foundation-stone will be laid about the third week in October, by Her Grace the Duchess of Abercorn. The contract of Mr. McClay, of Strabane, has been accepted at £4,200, including heating by water and lighting; and Mr. John Kennedy, of 18, Shipquay-street, Londonderry, is the architect.

## VILLA RESIDENCE, BOUNDSTONE.

The view shown in our illustration represents the garden front of a villa about to be erected within a few miles of Farnham, in Surrey. It is to be situate on high ground, and in a beautiful locality. In designing it the architect has had in view the adaptation of the plan to the site, as well as to the limited means at his disposal. The

south, or garden front commands a very extensive view; hence the windows of all the principal rooms have this aspect; the centre turret also, containing a room with a circular front window commanding the view all round, is especially designed for this purpose. The plan shows the rather peculiar position of the conservatory, the same being attached to the centre of the drawing-room bay window, which opens into it. The position of the library, which is not at present included in the estimate, is shown by the single line upon the plan, and this will open out of the inner hall. The walls are to be erected in red brick, with bands of ornamental brickwork, and the roof tiled; the style of finishing the interior to be simple. The estimate for erecting the portion shown upon the plan (exclusive of the conservatory) is £2,300. The architect is Mr. Henry S. Legg, of 32, Bedford-row, London.

## AFRICAN AND LAKE SUPERIOR TIMBER.

## AFRICAN.

THERE are so many reports as to the failure of European forests, which, if true, must be put down to incompetence on the part of those who conduct them, that it is refreshing to know, if the latest reports can be depended upon, that supplies equally (or nearly so) at hand can be had by ordinary enterprise. On his journey to Myera, Ukonongo, Mr. Stanley says:—

"We ascended a ridge bristling with syenitic boulders of massive size, appearing above a forest of dwarf trees. The view which we saw was similar to that which we had seen elsewhere. An illimitable forest, stretching in grand waves far beyond the view of vision—ridges, forest-clad, rising gently one above the other, until they receded in the dim purple blue distance—with a warm haze floating above them, which, though clear enough in our neighbourhood, became impenetrably blue in the far distance. Woods, woods, woods, leafy branches, foliated globes or parachutes, green, brown, or sere in colour, forests one above another, rising, falling, and receding—a very leafy screen. The horizon at all points presents the same view; there may be an indistinct outline of a hill far away, or here and there a tall tree higher than the rest, conspicuous in its outlines against the translucent sky: with this exception, it is the same—the same clear sky dropping into the depths of the forest, the same outlines, the same forest." The party camped underneath a sycamore 38ft. in circumference. A regiment might, with perfect ease, have reposed underneath this enormous dome of foliage during a noon halt. The Bemba wooded hills, as revealing a wealth of bosage of beautiful trees, many of which were in bloom, and covered with floral glory—then shades of groves and plantains are spoken of, banians and mimosa, with cassava gardens to the right and left of palmy forests. Nyamwezi, if a bird's-eye view were taken of it, would present a purple-coloured carpet of leafage of forests, apparently endless in extent. The labours of Dr. Livingstone are not thrown away. Subordinate to his great plan of abolishing slavery, he has benefitted every builder and timber-merchant in this country by either revealing, or being the cause of timber supplies being revealed, which, if we knew of, we have neglected, and must neglect no more. A careful analysis, drawn from various authentic sources, is quite convincing that African wood should be more extensively used in this market. The Coomassie campaign revealed to us treasures of timber almost at our doors, which we had thought little about, but the climate is a bar to European work; but our countrymen have not been in the habit of shirking danger, and, as a few Englishmen could rapidly organise African labour, there can be no real obstacle to the supply of every sort of African timber. As civilisation prevails, so will sanitary science advance. The judicious clearing of African forests will lead to roads being made, which will (along with other

civilising influences), do much towards bringing the inland tribes under the gentle influences of Christianity.

## LAKE SUPERIOR.

A report published at Toronto gives some particulars which are valuable, as being published under the auspices of the Legislative Assembly. The aspect of the country about the extensive and beautiful Lake of the Thousand Islands, and in many other localities on the shores of the larger lakes, bears traces in all directions of having, at a not very remote period, been covered with magnificent forests of white and red pine, and also, in patches, with the pitch pine of the Voyageurs, a tree which now prevails in its second growth, with aspen and birch. Everywhere isolated groves or trees of white and red pine of large dimensions occur, and among the young forest growth are seen scathed or half burnt trunks of large dimensions, remaining as witnesses of vast conflagrations, which have spread over many thousand square miles.

About twelve miles from Fort Francis the explorers found an interval of about 280 acres, covered by the richest profusion of rose bushes, woodbine, &c., fringed by elms, balm of Gilead, ash, and oak. One elm-tree measured three feet in diameter, or nine feet eight inches in circumference, and a fine growth of trees was constantly noted. Basswood is not uncommon, and sturdy oaks, whose trunks are from eighteen to twenty four inches in diameter, are seen in open groves, with luxuriant climbing plants growing beneath them. Near the Rapid of Rainy River were found aspens of very large dimensions, balm of Gilead, basswood, birch and oak, and also elm. From Lake Superior to the Red River, the Valley of the Kaministiquia is wooded to some extent with small pine, and the alluvial valley sustains elm, aspen, balsam, poplar, ash, and butternut. In addition, the rear portion of the valley contains birch, black and white spruce, and some heavy aspens. The area of Great Dog Lake probably exceeds 200 square miles, and is covered with forests in which white spruce prevails, interspersed with groves of aspens and occasionally dotted with the Weymouth (white), and Banksean (red) pines; white and yellow birch are abundant, and some of them are of large dimensions. In the Valley of Dog River the Banksean pine and aspen grow in abundance. Prairie Portage sustains good spruce and fir of fair dimensions. One "banksina" measured 5ft. 9in. in circumference, 4ft. from the ground, and many of equal dimensions are to be found in the neighbourhood. The immediate banks of Savanne River are clothed with alder, willow, and dogwood, behind which are to be seen tamarack, spruce, and aspen. Among the trees at the Portage des Pins, remarkable for their size, cedar, ash, white and red pine, with birch of two kinds, may be enumerated. The fourth large expanse of Sturgeon Lake is limited by low, densely-wooded shores, and white cedar now becomes common and dense pine groves show themselves at Island Portage. This portion of our possessions in North America is barren in comparison with other parts which may hereafter be noticed, but it will be observed that there are abundant opportunities of timber cultivation. Everywhere in this district are seen the result of blind, ignorant waste by Indians burning down the forests, but no more blind and ignorant, in truth than the conduct of whites all over the world, who have been in the habit of exterminating a forest as if it were an enemy instead of a friend. A determined search for coal-seams will lighten the timber trade of much anxiety, for so much Canadian and other timber is used for firewood. With coal—and it is proved that the Red River district can supply it—no fears can be entertained as to the future, and if our friends in Russia and Sweden will wisely abstain from using so much wood as firing, and turn their attention to procuring coal, they will not only have to offer us a larger yearly supply of wood, which we are always ready to buy, but also save themselves from many inconveniences from which they now suffer.

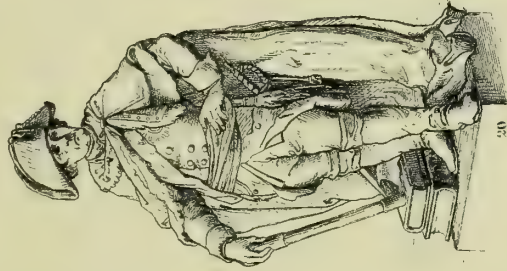
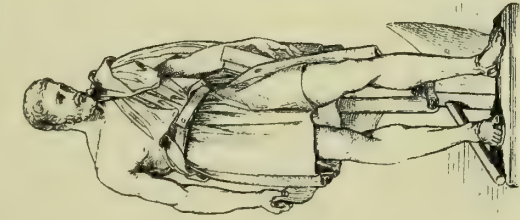
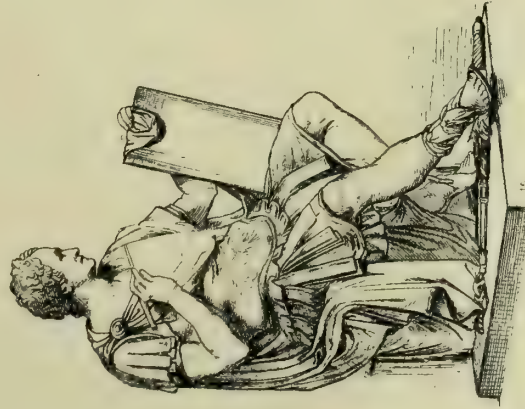
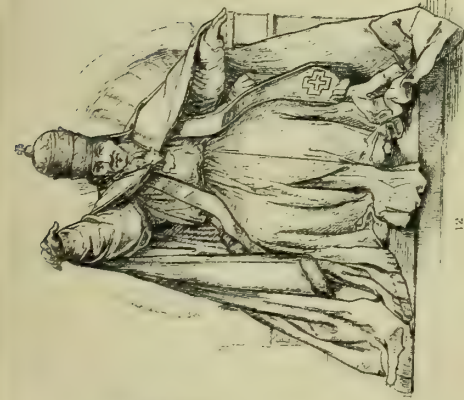






















LISEUX CATHEDRAL  
APSE AND TRIUMPHAL  
ARCH

chapel.

Line of wall

clerestory

Ridge of spire

chapel

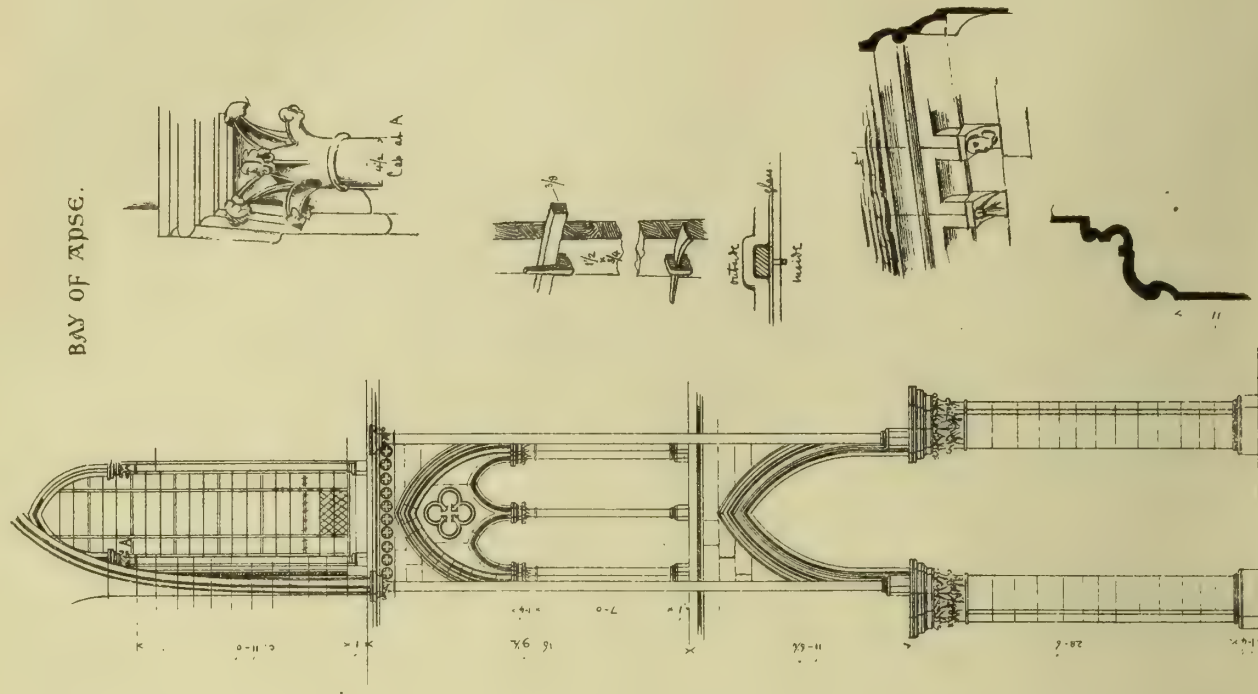
Ridge

Axis of wall

26 - 9 1/2

26 - 9 1/2

feet



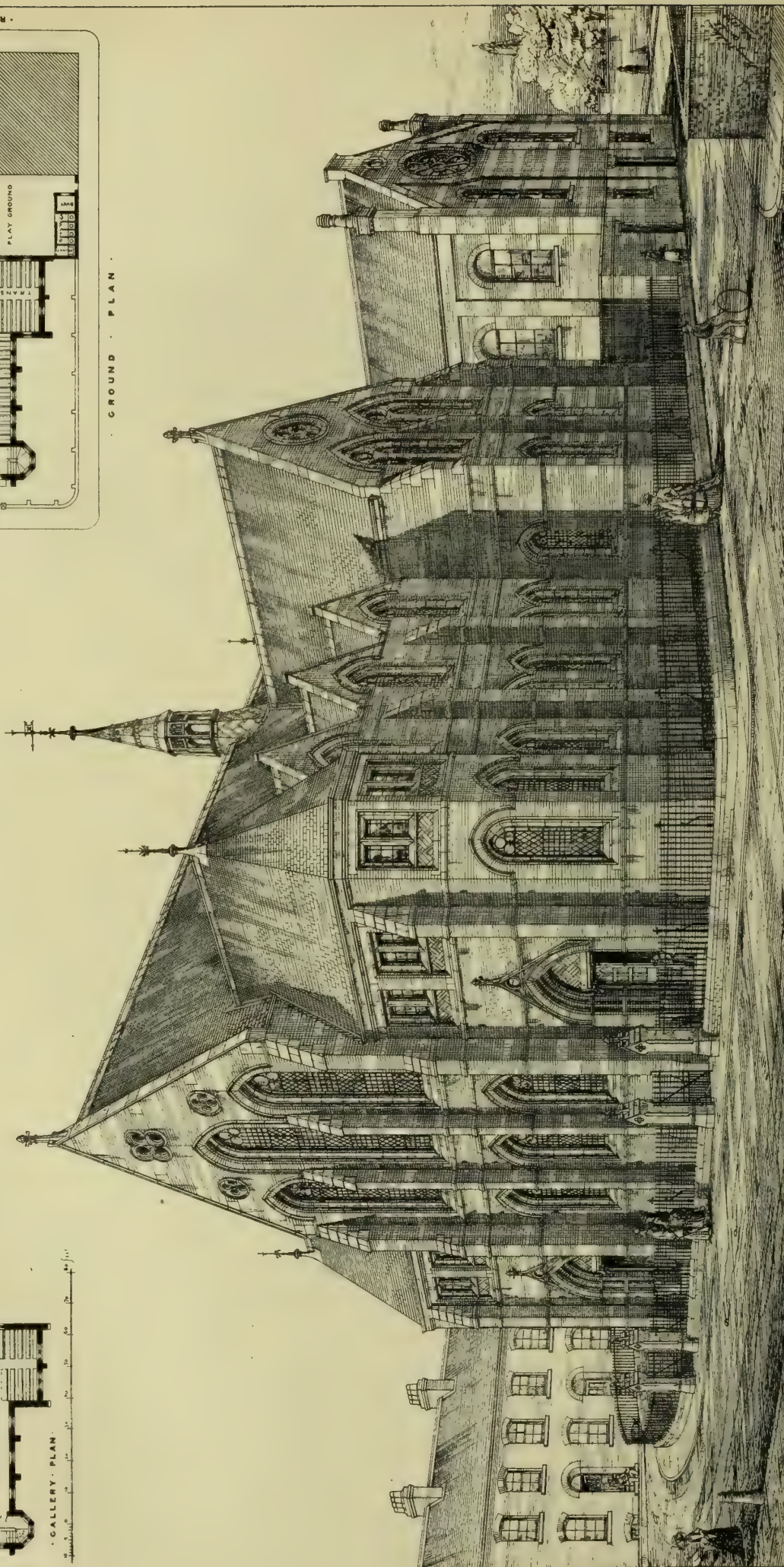
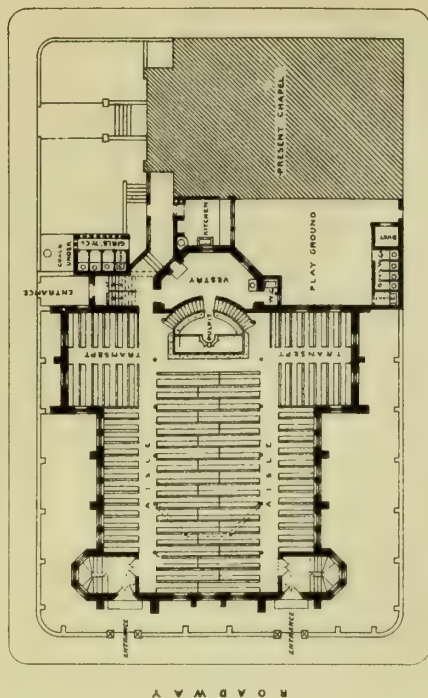
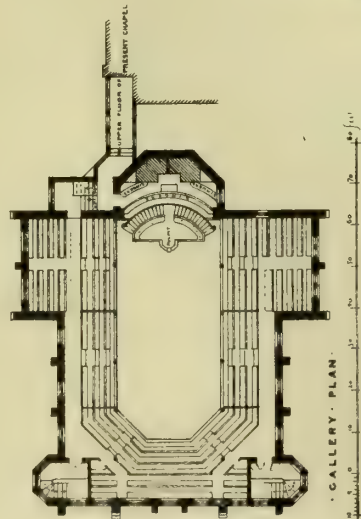
BAY OF APSE.





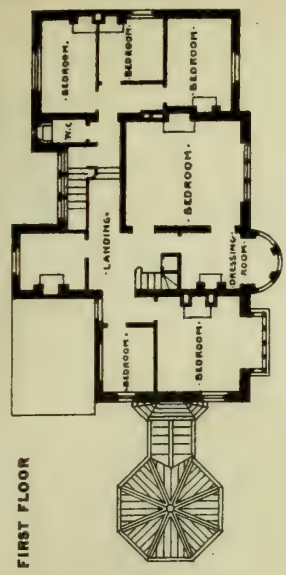
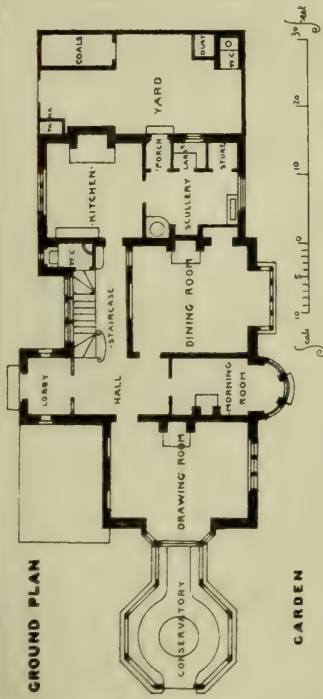


Proposed Wesleyan Chapel .  
New Wortley .  
Henry Walker . Architect . Leeds .





VILLA RESIDENCE FOR R. MILEY ESQ<sup>RE</sup> BOUNDSTONE  
HENRY S. LEGG ARCHITECT.









: Adforton Church: Herefordshire:

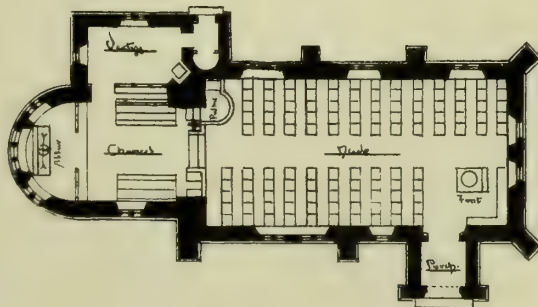
About to be built for  
£ 965



: View from North-East :

Accommodation.

Chairs in Pulpit 115  
Seats round altar 6  
Chairs in Porch 12  
133 Total.



@ scale :

Scale of Feet 0 10 20 30 40 50

: John P. Sedding Archt. 1 Queen Anne's Gate  
Westminster - July 1874 :







## NOTES IN THE STREET.—V.

IN our last Notes we spoke in commendable terms of the new Saracen's Head Hotel, in Snow-hill, the work, we believe, of Mr. Lock, and which has replaced the old Saracen's Head, a famous inn of the old mail-coach days, into whose spacious portals many a dusty and heavily-laden coach has rumbled, and many a weary traveller—"of the *bonâ fide* class" shall we say?—has taken refuge under its old oaken-beam ceilings. Its old courtyard, whose site is now extinguished, is indeed full of memories. Dickens has made its name famous also. Here, we are told, Nicholas Nickleby and his uncle waited upon the schoolmaster Squeers, of Dotheboy's Hall. It is described by Dickens as one of the most important mail-coaching inns, for arrivals and departures, in London. We cannot pass by this author's description of the old building:—"Next to the jail, and by consequence near to Smithfield also, and the Compter and the bustle and noise of the City, and just on that particular part of Snow-hill where omnibus horses going eastwards seriously think of falling down on purpose, and where horses in hackney cabriolets going westward not unfrequently fall by accident, is the coach-yard of the Saracen's Head Inn, its portals guarded by two Saracen's heads and shoulders, which it was once the pride and glory of the choice spirits of this metropolis to pull down at night, but which have for some time remained in undisturbed tranquillity, possibly because this species of humour is now confined to St. James's parish, where doorknockers are preferred, as being more portable, and bell-wires esteemed as convenient toothpicks. Whether this be the reason, or not, there they are, frowning upon you from each side of the gateway, and the inn itself, garnished with another Saracen's head, frowns upon you from the top of the yard, while from the door of the hind-boot of all the red coaches that are standing therein, there glares a small Saracen's head with a twin expression to the large Saracen's head below, so that the general appearance of the pile is of the Saracenic order."

This picturesque description of the old tavern, by the author of "Pickwick," cannot be realised now, with the proximity of the Chatham and Dover Railway, and within hearing distance of the railway whistle. Even the Saracen's head is nowhere to be seen, and the galleried courtyard exists only in the imagination or in the pages of the romancer. The surroundings of the locality also are not likely to recall associations of the old inn, which possessed, from the descriptions and sketches we have seen, all the peculiarities of the English inn of the olden time.

Standing upon Holborn Viaduct, and looking down across Snow-hill, we are led to hope the admirable plots and gaps of open ground may be built upon with some regard to good taste. As the land belongs to the Holborn Viaduct Land Company, who acquired it since the improvements, it is probable some uniformity of building regulation will be exercised, though the plots are to be let on leases or houses erected to suit the convenience of tenants. The building *débris* and operations at Smithfield Market and on adjacent land look like progress, and, from being the dingiest and dirtiest, it is likely this locality will become one of the most open and cleanly.

The Association of Land Financiers are finishing a palatial-looking pile at the end of Holborn, near Newgate Prison. Its pavilions and Mansard roofs and dormers contrast rather quaintly with the dingy mass of old Newgate. When the scaffolding is down a better opinion may be formed of this new pile of building. It struck us that the façade is rather too much cut up by the lines of window dressings. The pedimental heads of the first and upper floor windows are heavy and overcrowded, and the alternation of the circular and triangular forms of pediments is, we think, a doubtful feature; but we will not comment further upon it now. Mr. Cronk, we believe, is the architect.

By the way, old St. Sepulchre's Church is undergoing an external restoration. It stands on Snow-hill, and its old tower looks as if it had many a casing and improving according to the varying tastes of the times. Its lofty corner pinnacles have lately been restored in a pseudo-Gothic taste; each is crowned with a weather-vane. The church also appears to have been cased in Portland stone, for we have the old, genuine circular form of Wren's windows lighting the aisle, the façade of which, in all probability, replaced the Gothic case with battlemented parapet which

the old views of the church show us. The original church indicates a Late Gothic style, and it was rebuilt in this style about the middle of the fifteenth century. A porch projecting at the south-west corner from the tower, of Late Perpendicular, is worth notice. It is groined interiorly with panelled tracery of the fan kind, and the ribs and mouldings and details generally are good. Interiorly the church is divided into nave and aisles by ranges of Classic columns of the Tuscan kind, springing from which directly are semicircular arches. A heavy Classic cornice surrounds the church. The aisles are groined and are filled with the old-fashioned galleries of oak of a semi-antique age. But we will notice the church more in detail in another Note; in the meantime we just allude to the florid-looking Gothic windows and buttress-heads of ogival form, and other parts of the tower and porch, which are now undergoing restoration under Mr. Griffiths.

A very noticeable improvement has been made at the corner of Fleet-street and New Bridge-street, Blackfriars, by taking off the awkward and abrupt angle which existed. For a long time this angular plot has been an unsightly inclosure obstructing the flow of traffic from New Bridge-street—a most important thoroughfare—to Fleet-street, and choking up that very contracted crossing, Ludgate-circus, which may be considered one of the centres of the City, and which some of its main arteries intersect. Ludgate-circus, already too small, will now be at least a completed circle; the angle which has just been cut off being the only one of the four corners that remained square. When the City authorities were about it, they might have cut off even more of these angles and given us a larger circus. Ludgate-circus is always a crowded, and we may add dangerous, crossing; strangers are in perpetual danger of being either driven over or blocked up, and but for the vigilance of our street police many more accidents would happen.

## ST. PAUL'S CATHEDRAL.

IN the *Contemporary Review* for October, Mr. James Fergusson has an article on Mr. Burges' scheme for the decoration of St. Paul's Cathedral. Mr. Fergusson is of opinion that Wren thought his own work complete—with a few trifling exceptions—and that to the education of the public taste during the last fifty years to an appreciation of the value of colour in connection with architecture is due the present dissatisfaction with St. Paul's as it stands. The successive attempts to complete the Cathedral by Deans Milman and Mansell are reviewed by Mr. Fergusson, up to the appointment, "by the narrowest of narrow majorities," of Mr. Burges as architect. Mr. Burges' appointment and his scheme of decoration are of course condemned by Mr. Fergusson, in whose opinion two courses are at present open to the Restoration Committee: either to carry out Mr. Burges' scheme for the apse and one bay as at present determined, or frankly to start again from the point where we were when Mr. Burges' appointment was first determined upon. Supposing the latter course adopted, Mr. Fergusson advises the appointment of a new Fine Art Committee, consisting of amateurs, artists, and architects, or others possessing sufficient knowledge to guide such an enterprise, and sufficiently numerous and influential to command the confidence of the public. We give the conclusion of Mr. Fergusson's article, in which he indicates the course which, in his judgment, the new Committee should pursue:—

"When the Committee settle to their task, the question will inevitably again arise whether they should appoint an architect to assist them or not. The expediency of doing so is a perfectly open question, but if decided in the affirmative, one of the first conditions of the appointment ought to be that he should make no designs himself, beyond general sketches indicating the position and extent of the proposed decoration. What is wanted is not a new design, but merely the completion of one made 200 years ago, and nine-tenths of which are already complete. As no structural alterations are contemplated, there is no opportunity of his exercising his skill as an architect, and as far as that is concerned a non-professional man would do as well. But what the committee do want is a man so familiar with all the peculiarities of the style in which the church is built that he can detect and prevent anything incongruous that may be suggested. They want, too, a man of business, who can see that contracts are properly framed, and knows when they are properly executed, and they also want some one who

has passed his life in artistic circles, and knows consequently the men best qualified to execute any particular kind of work, and able consequently to point them out for selection by the committee, and such a man is only to be found in the ranks of the architectural profession. If, however, he is also to design the works himself, it must eventually result in the committee being dependent on the assistance of one mind only instead of many, and unless he is a universal genius the result would be a mediocrity in execution, which would probably be fatal. The best artists would hold aloof, for they know it would be of no use attempting to compete against "the man in possession," and the committee would not have that range of selection among all the best artists in Europe which seems indispensable for the successful carrying out of such an undertaking.

"If appointed, the architect ought certainly to be paid by a salary, not a commission. When the necessary amount of money to be expended bears a certain definite relation to the amount of work to be done, and that is also proportioned to the amount of labour, thought, and responsibility to be incurred, a commission is a fair and reasonable mode of remuneration. But when the artist is left to say whether the expenditure shall be £40,000 or £400,000, and his commission consequently either £2,000 or £20,000, it is not in human nature to resist looking complacently on the larger figures. It may or may not lead to large estimates; but it certainly is not a means for promoting economy, and no committee is wise in laying themselves open to the charge of encouraging extravagance, and no artist ought to be exposed to the possible reproach of having yielded to such temptation.

"Having settled these and other questions regarding the *personnel* of the undertaking, the next point to which the Executive Committee must turn their attention is to determine what amount they are likely to receive, and what, consequently, they ought to allot to the decoration of St. Paul's.

"If £400,000 were placed at the disposal of the committee to-morrow, I maintain, without hesitation, that it would be a wicked piece of foolish extravagance to waste it on the adornment of the interior of St. Paul's. The expenditure would not in any way remedy the inherent faults of arrangement or details which are the real defects of the design—perhaps rather exaggerate them, while there are fifty ways in which such a sum might be expended which would be more useful for the improvement of the arts, or the promotion of religious sentiment, than this. If the committee had £200,000 at their disposal, it might—as hinted above—be worth while to throw Sir Christopher overboard as completely as Mr. Burges has done, and face the whole difficulty and alter the internal architecture till it was rendered as beautiful as the exterior. The public, however, have no such confidence in any living architect or any set of men, that they would listen for one moment to such a proposition. Perhaps they are right, but whether right or wrong, certain it is it would not be tolerated. That being so, there is nothing left for it but to make the best we can of the building as it stands, and for that purpose my conviction is that £100,000 would amply suffice. This, too, is a sum the committee may reasonably hope to raise within the next ten or fifteen years. After such a breakdown as has occurred it will require great influence, great prudence, and harmonious working, to extract the £60,000 necessary to make up this sum from the pockets of the subscribers; but it probably may be done, while the realisation of the larger sum seems simply impossible. Another great advantage of starting on this more moderate scale would be, that if that amount cannot be obtained, less would suffice without resorting to any mean or temporary expedients; while the works can easily be so designed that if more money became available, ornament may be added to any extent without undoing anything that has been done.

"Assuming such a scale of expenditure, its apportionment would probably be in something like the following proportions:—

Nave and side aisles .....	£15,000 or 20,000
Dome above whispering gallery .....	20,000 „ 25,000
Dome from gallery to floor .....	15,000 „ 10,000
Transept .....	10,000 „ 10,000
Choir and apse .....	30,000 „ 25,000
Contingencies and extras .....	10,000 „ 10,000
	£100,000 £100,000



Of course these proportions may and must be varied to some extent when drawings are made and estimates obtained, but probably not to any great extent. In the nave what is most wanted is a marble pavement of good and rich design, and a certain amount of marbling in plinths and panels. This would contribute more to give a furnished and finished look to the whole than any amount of colour in the roof.\* In addition to this, a certain moderate amount of gilding and colour might be applied to the capitals and cornices, and the smaller domes must be finished with figure-painting or emblems, but either in monochrome or with the least possible amount of colour. The windows require re-glazing, but might be done with ground glass, probably with a cut pattern in it, and set in ornamental frames. If any colours are introduced into them, it should only be as jewels, and occupying not more than one-twentieth of the whole surface. If all this were done it would relieve the present cold, unfinished appearance of the nave in a wonderful manner, and to as great an extent as is compatible with the rest of the architecture as it is, and must remain.

"In the dome and transept we have the example of St. Peter's, which must to a great extent be followed, and the sum set down will probably be sufficient to reproduce it in all essentials, except that we must be content in the lower part with honest Portland stone, instead of the sham plaster marbles, and must omit the picture mosaics of our model.

"The keynote for the decoration of the choir must be the stall-work in oak at present existing. If Mr. Burges' decoration was carried out, this must inevitably be replaced by marble stalls with canopies, either in the same material or in ebony and ivory, or some such material, as is generally done in the Italian marble churches we are told to admire. If the present stall-work is retained, such a decoration as that suggested for the nave would be in harmony, though it might be made richer, and the sacarium must of course be enriched to a greater extent than any other part of the church; and all this, it is believed, could be done for the sum set down.

"When these preliminaries are settled, the next point would be to determine what part of the work should be first undertaken. I would suggest the great dome. First, because it is the only part that is offensive, except from its plainness, but also because it is the only part regarding which we feel sure we know what the original intentions of the architect were. We also have in St. Peter's a model which, *mutatis mutandis*, we may confidently follow. Nothing of the same sort has been so successful in modern times, and it will be difficult to surpass it. Another reason why the dome should be first attended to is, that being farthest from the eye, and less seen in connection with any other part of the church, any mistake consequently that might be made would be less apparent, and interfere less with anything that might be done hereafter.

"The spandrels of the great dome and the decorations of the smaller domes of nave and aisles might follow. The last thing that should, I fancy, be undertaken, is the choir and apse—not that these are less important than other parts of the church—on the contrary, it is because they are the most important, and also, unfortunately, the most difficult, that it seems it would be most unwise to attempt their decoration before we have more knowledge of the materials and processes we are going to employ, and more experience of the comparative skill or ability of the artists who may be selected for the work.

"During the three or four years in which the works of the dome would be in progress, there would be time to mature the plans for the east end, and during that time a school of artists would be formed who might be capable of carrying it out. To attempt it first would be to risk a failure which might mar the whole project.

"Supposing the dome or any other part of the work to be selected for a first experiment, and the amount to be expended upon it determined, there would be no difficulty in obtaining sketches from ten or a dozen architects or artists for its execution, and as little in selecting three or four of these as the most suitable for the purpose. But before going beyond this, the most im-

portant step in the whole process would be a resolution on the part of the committee that no attempt should be made to carry any design permanently into effect before it had been tried; not on a toy mould, but on the walls of the church itself. In the case of marbling, a few shillings spent in the purchase of marble papers will suffice to ascertain the effect of introducing that material, at least to the extent above suggested, and when mosaics or other decorations are proposed, a few pounds would be sufficient for the preparation of cartoons of the full size, and so coloured as to prevent anyone standing on the floor of the church from ascertaining whether they are real mosaics or not. As already mentioned, a great part of the mosaics of St. Peter's are still in the paper stage, and few are aware of it.\* Sooner or later these full-sized cartoons must be prepared, but I do not believe that any artist can judge of their effect at the distance from the eye, and under the peculiar circumstances of light and air in such a place, for instance, as the great dome without seeing them *in situ*. It must be of immense advantage to the artists to see their own work and those of others *in situ* before being finally called on to execute it. As great an advantage to the committee, who, besides having this means of judging, would have the benefit of the criticisms of other artists and the public generally before being called on to decide. At the same time, nothing probably would give more confidence in the acts of the committee than this public appeal to the judgment of all the world before finally deciding on anything.

In a few words, the conclusion I have arrived at, from a very careful study of the subject during the last four or five years, are that, when fairly looked at, few problems present a simpler and more certain solution than those involved in the completion of St. Paul's. So much is done, that little remains to be done; what that little should be, is so clearly indicated by the style of the building, and that of contemporary examples, that it is difficult to go wrong in matters of taste when the subject is fairly approached. My conviction also is that £100,000 is amply sufficient, more indeed, than is necessary, to complete the church, and to bring its decoration up to the highest point compatible with its architecture, provided no radical or structural alteration is contemplated.

"Holding these opinions, I cannot but regard Mr. Burges' proposal as absurdly extravagant, and, in fact, impossible, in so far as outlay is concerned, and at total variance with every principle in matters of taste that ought to guide any committee in completing and adorning this great work of Sir Christopher Wren."†

#### LECTURES ON ART HISTORY.

**SUBJOINED** is the syllabus of forty lectures on the Historical Development of Ornamental Art, which will be delivered by Dr. G. G. Zerffi, F.R.Hist.S., during the two sessions 1874 and 1875, on Tuesday afternoons at three o'clock, in the Lecture Theatre of the South Kensington Museum. The first will be delivered on Tuesday next, October 6.

**PRE-HISTORIC AND SAVAGE ART.**—Lectures I., II., III., IV., and V. Prolegomena. The cosmical laws in their relation to Art in general. Aspect of Nature. Symmetry, Eurythmy, and Proportion: first attempts at ornamentation. Stone implements. Pottery. Textile fabrics. Oceanic tribes and their customs. New Zealand. Mexico. Nicaragua. Peru and Chili. Animal mounds. Sculptures and stucco. Principles of ornamentation.

**ANCIENT ART.**—4000 B.C.—250 B.C.—Lectures VI., VII., VIII., and IX. India and Egypt. The

\* So convinced was I personally of the importance of this process, that before going to Italy I had contracted with an artist to prepare and fix up a full-sized cartoon for one of the spandrels of the dome under the whispering gallery. I did not expect or intend that the commissioners should accept my design. All I wished to show was how easy it might be made to judge of the effect of any design before it was too late. Had this process been followed in the case of the two mosaics now there, they probably never would have been executed in a permanent material.

† In order to prevent any misunderstanding, I may state that none of those who have been acting with me on the committee for the completion of St. Paul's, have anything to do with this article. One of them knows, but only by accident, of my intention to write it. The others do not, and have consequently no responsibility connected with it, either direct or indirect.

Assyrians and Babylonians, Persians, and Chinese. Relations of these nations to one another. Their mode of ornamentation. Influence of Brahmanism and Buddhism on Indian, Egyptian, and Chinese Art.

**CLASSIC ART.**—1000 B.C.—180 B.C.—Lectures X., XI., XII., XIII., XIV., XV., XVI., XVII., XVIII., XIX., and XX. The Mythology of Greece. Homer and Hesiod. Manners and modes of living among the Greeks. Their architecture. Classification of temples. General principles of Greek ornamentation. Private dwellings and theatres. Sculpture chronologically treated. Dresses, furniture, pottery. Greek painters, the colours they knew and how they used them.

**ETRUSCAN AND ROMAN ART.**—600 B.C.—150 A.D.—Lectures XXI., XXII., XXIII., XXIV., and XXV.—Etruria. Pottery and bronze works. Fashioning in clay. Etrurian Ornamentation may be traced to Assyria, Egypt, Phœnicia, and Greece. Roman Art, the outgrowth of Etruscan and Greek elements. Eclecticism in the products of Roman Art. Dresses, ornamentation, domestic furniture, weapons, standards, crowns. Public and private buildings. Over-decoration and correct ornamentation.

**EARLY CHRISTIAN ART.**—100 A.D.—900 A.D.—Lectures XXVI., XXVII., XXVIII., XXIX. Catacombs. Ornamentation. Symbolism. First Churches. Their architecture and decoration. Traces of Hindoo-Buddhistic and Hebrew-Egyptian influences on Christian Art. Ivory and wood carvings. Diptychs and Triptychs. Celtic, Scandinavian, and Saxon Monuments. Round towers. Irish crosses, customs and manners of the Teutons and Gauls.

**MUHAMEDAN ART.**—650 A.D.—1500 A.D.—Lectures XXX., and XXXI. Revival of Art in a special form. Flowers and plants. Arabesques. Geometrical tracery. Mosques in Asia Minor, Egypt, India, and Spain. Mode of ornamentation. Textile fabrics: Shawls and carpets. Use of colours, dresses, weapons, saddles, and every-day utensils. Pottery: Mode of ornamentation.

**ECCLÉSIASTICAL ART.**—900 A.D.—1200 A.D.—Lectures XXXII., XXXIII., and XXXIV. East and West. Byzantine and Romanesque styles. Church decorations. Heraldry, and ornamentation in detail. Sub-division of the Romanesque Style.

**GOTHIC ART.**—1200 A.D.—1500 A.D.—Lectures XXXV. and XXXVI. Cathedrals and their ornamentation. Church furniture. Weapons, helmets, spears, shields, and swords. Pottery, glass ware, and painting. Specimens of bronze and iron works. Illuminated MSS. Principles of Gothic ornamentation in detail.

**RENAISSANCE ART.**—1500 A.D.—1780 A.D.—Lectures XXXVII. and XXXVIII. Revival of Classic Art. Decorative principles. Sculpture and painting. Decoration of churches, palaces, and houses. The North and South of Europe. Difference in styles. Pottery and bronze works.

**MODERN ART.**—1780 A.D. to our own times.—Lectures XXXIX. and XL. The museums of Europe and their principal art collections. Idealism and realism. Causes of the progress and the decay of Art. Aesthetic principles of good ornamentation. Conclusion.

The Lectures will be illustrated by photographs, diagrams, maps, plans, and sketches.

#### THE WALKER ART GALLERY, LIVERPOOL.

ON Monday the Duke of Edinburgh laid the foundation-stone of the new Walker Art Gallery, Liverpool. The building—which will be in accordance with plans prepared by Mr. Cornelius Sherlock, of James-street, and Mr. H. H. Vale, of Central Chambers, South Castle-street—is in the Corinthian order of Grecian architecture. In the centre of the front facing William Brown-street, there is a portico, consisting of four fluted columns with carved capitals, approached by a handsome flight of twelve steps. Above the portico are a pediment and attic, crowned by a figure representing the Arts. On either side of the portico is a solidly-designed group of statuary, representing Science and Literature; and above are panels carved in bas-relief. To the right and left the facade extends 70ft., making, with the central portion, a frontage of 180ft. to William Brown-street. The wings on the right and left of the portico consist of three large windows upon the ground-floor, with a continuous frieze and cornice above, the frieze over the windows being ornamented with a bold fret enrichment. Above these openings are long panels, running almost the entire length of the wings, and containing bas-reliefs representing subjects having reference to the purposes of the building. The whole of this portion of the facade is surmounted by a medallion cornice and open balustrade, the total height being about 50ft. The extreme ends of the front of the building are finished with projections in rusticated and panelled masonry, with pilasters having Corinthian capitals and bases standing upon a boldly-moulded plinth, continued up to the portico upon each side. The main doorway is deeply recessed beneath the central portico, and opens into a vestibule lighted by each side of the doorway, the flooring formed

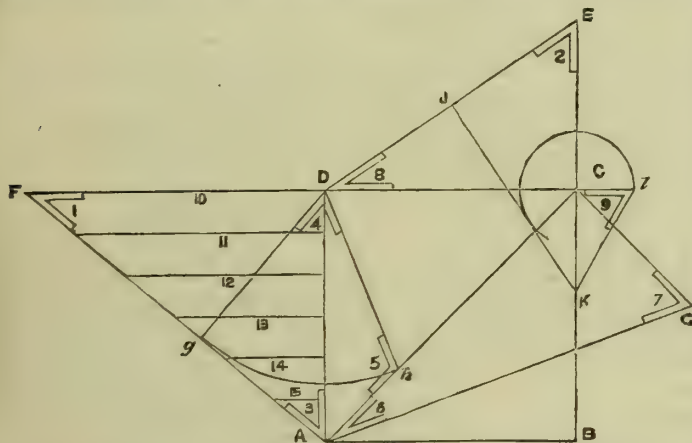
\* If universal experience is any guide in this matter, Mr. Burges' system is hopelessly wrong. We place richly coloured carpets on our floors, we paint our walls in rich bright colours, and we whitewash our ceilings. I do not know one instance of a rich and warmly coloured roof supported on cold grey walls.



of encaustic tiles. Beyond the vestibule is a spacious hall with panelled ceiling, at the end of which, facing the grand entrance, is the staircase leading to the picture-galleries. The whole of the ground-floor of the building is appropriated to sculpture and museum purposes, lighted by windows at the sides, and consists of two large galleries 70ft. long by 30ft. wide, and two galleries 46ft. long by 35ft. wide. Upon this floor retiring-rooms and other suitable apartments will be provided. The picture-gallery proper occupies the upper portion of the building, and is approached by the staircase, which leads to a large hall lighted by windows in the roof. Out of this hall open two miniature-rooms and six galleries of the same dimensions as the sculpture-galleries beneath, but more lofty, and having their light entirely from above. The plans have been prepared with a view to further extension.

### THE HIP ROOF.

A CORRESPONDENT has sent to the *English Mechanic* the inclosed diagram, which exhibits a short and correct method for finding the bevels for the different cuts, and also the lengths of the jack rafters required in the construction of a hip roof. Let A B C D be the horizontal plane, and C D E the elevation of one-half of the hip; prolong the line C D to F, and make D F equal to D E; join F A and also A C; on the line A F let fall a perpendicular from D, meeting F A at g; take D for centre and D g for radius, and describe the arc to meet A C at h; join D h. Square down a line from C to G and make G C equal to C E; join A G, which gives the length of the hip rafter. The Bevels: No. 1 is for the sidecut and No. 2 for the downcut of



the jack rafters for fitting the side of the hip rafter; No. 3 is the sidecut and No. 4 is the downcut for the end of purlin to fit the side of hip rafter, and No. 5 is the bevel for backing the hip rafter. The bevels 6, 7, and 8 need no explanation. It may be remarked that the bevel No. 4 is only correct when the height of the roof is equal to one-third of its base; and when the height varies from that proportion, the method for finding the bevel is shown at C, which gives a correct rule under any conditions. From any point on line D E J square down a line meeting B C at K; from C as centre, describe the arc touching the line J K, and meeting the end of the line D C at l; join l K, and in the angle the bevel No. 9 is seen, and is equal to the angle No. 4. The jack rafters are Nos. 10, 11, 12, 13, 14, 14, and their lengths can be found exactly if a large scale is used—say lin. to the foot.

The Great Northern Railway Co. have just erected a new goods warehouse at Retford. It is a substantial building, 101ft. long by 31ft. wide. Messrs. Kirk and Parry, of Sleaford, are the contractors, and the work has been carried out under the direction of Mr. J. B. Coney. Nearer to the passenger-platform a long engine shed is being built. Mr. John Wilson, of Retford, is the contractor.

The reconstruction of the Pantechnicon is nearly complete. Every precaution has been taken to prevent a recurrence of the disaster caused by the fire of February last, iron being used in the work where wood is the ordinary material, even the doors and joists being of iron. Fireproof bricks have been used. A huge tank has been put up which will hold half a million gallons of water, and which is connected with all the hydrants of the premises.

## Civil Engineering.

A NEW HARBOUR AT BOULOGNE.—A commission, appointed by the French Government to inquire into a plan for a projected deep sea harbour at Boulogne, as designed by Messrs. Legros and Liddell, has just held its first sitting at that port. The plan has been designed to overcome the objections to a former scheme which was rejected by the Council General of the Ponts et Chaussées, on the ground that it would cause the silting-up of the present harbour; and the total estimated cost of carrying it out is £500,000, which amount the South-Eastern Railway Company has obtained Parliamentary sanction to expend in improving harbour accommodation on the French coast. The new plan comprises a main pier 1,400 metres in length, starting from the S.W. angle of the battery on the south side of the present harbour, running in a W.N.W. direction, or almost parallel to, and at a distance of one-third of a mile south of, the existing west jetty, of which it will be three times the length; a stone jetty 100 metres to the west of, and parallel to the steam pier, built upon arches to allow a free passage to the current, and carried out abreast of the steam pier head, from which point it will bend to the eastward for 600 metres, and assume the shape of a curved horn; an extension of the present east jetty 1,200 metres in a curved line towards the west; a stone breakwater 300 metres long, running north-east and south-west, built off the entrance, leaving a passage of 200 metres at its south end, and 100 metres at the north; and the reclamation of a large portion of the foreshore. The Boulogne New Harbour Company ask for a concession for 99 years, at the expiration of

which period the property will revert to the State, and the possession in perpetuity of the reclaimed land. The length of the new harbour will be over three-quarters of a mile, and the width upwards of one-third of a mile.

PROPOSED TUNNEL UNDER THE MERSEY.—The Mersey Railway Co. propose to raise a special fund of £50,000 for the purpose of sinking a shaft on the Liverpool side of the Mersey, and driving a heading under the river so as to connect it with the shaft already sunk close to the Woodside Ferry. Messrs. James Brunlees and Charles D. Fox, the Engineers to the Company, state in the Report to the Directors that they have carefully investigated the nature of the strata under the river through which the Tunnel passes, and have ascertained that the rock is bare for two-thirds of the distance, and that for the other third, on the Liverpool side, it is covered by a deposit of sand and clay, the thickness of which they have proved by the use of boring tools, and so ascertained the exact position of the rock; and with this knowledge they have so designed the line and level of the tunnels that at no point will there be less than 35ft. of solid rock between the crown of the arch and the bed of the river. The question of time required for making the tunnel under the river being a very important one, they have given it much consideration. The distance from shaft to shaft is just one mile, of which 1,300 yards are under the river. The headings could be driven in fifty-five weeks, and they have no hesitation in stating that the full-sized tunnels and all other works could be completed within two years. The drainage of the tunnel will be effected by running a driftway with a slight fall from the centre of the river to the bottom of the shaft on the Cheshire side, from which the water can be pumped and discharged. To meet the possibility of water percolating from the river, they have provided for lining the tunnels with Staffordshire blue bricks, set in Portland cement. They have also arranged for pumping power fully sufficient to deal with any probable quantity of water which may be met with during the progress of the works. Tunnelling in the Red Sandstone is well known to be easy and rapid, and all their

investigations confirm their former opinion that this work can be executed within the price at which it is contracted for, and within the time already named.

## Building Intelligence.

### CHURCHES AND CHAPELS.

BINGLEY.—A new Wesleyan chapel has been opened at Bingley, York. The design is in the Early Decorated Gothic style. The building contains on the basement floor a schoolroom, 55ft. 6in. by 45ft.; three large classrooms, and a tea-makers' room. The chapel proper comprises the nave, 81ft. 6in. by 45ft.; two transepts, each 26ft. by 11ft.; and chancel, 26ft. by 18ft. The whole of the building is faced with pitch-faced parpoints from Allerton Quarries, relieved by dressings of chiselled ashlar from the neighbouring quarries. The building was designed by Mr. J. P. Pritchett, of Darlington, under whose direction, assisted by Mr. Wm. Sharp, treasurer and hon. clerk of the works, the work was carried out. The chapel, we may state, is seated for 1,200, and there is accommodation in the schools for about 1,000 children.

BRIDLINGTON QUAY.—A new Baptist chapel was opened at Bridlington Quay on the 22nd ult. The edifice is built of yellow brickwork, ornamented with coloured bricks, while the windows and dressings generally are executed in Whitby stone. The chapel is in the Early Decorated style of Gothic architecture, and comprises a nave 75ft. long and 34ft. wide, with shallow transepts. It is capable of accommodating 500 persons. Mr. Samuel Musgrave, of Hull, is the architect. The contractor was the late Mr. John Rennard, of Bridlington Quay.

BLAKESLEY.—The parish-church of Blakesley, Northamptonshire, was reopened, after restoration, on Thursday week. It is a small edifice, with a tower, north and south aisles, a south porch, and a chancel. It is mostly of the Early English period, and probably dates from about the middle of the thirteenth century. The architect included in his plan of the restoration designs and estimates for the entire restoration of the chancel, together with its extension to its original dimensions. The plan also includes the substitution of a proper high-pitched roof for the present one. But this portion of the edifice does not belong to the parish, and there appears to be some difficulty about carrying out the alterations proposed. The inside of the edifice has undergone thorough restoration. The walls, which were formerly plastered, have been thoroughly cleaned and repainted. The jambs, &c., of the windows have also been cleared of the plaster, and restored throughout. The gallery which defaced the west end has been removed, and the tower arch thrown open and restored. The work of restoration has been carried out by Mr. Gee, of Daventry, from the plans, and under the superintendence of Messrs. E. F. Law and Sons, of Northampton, at a cost of about £1,500. The estimated cost of the chancel is £520.

BLUNDELLSANDS.—The new church of St. Nicholas, Blundellsands, was consecrated on Friday last. The building is in the Early Decorated style, and consists of chancel, nave, and north and south aisles. The external facing of the church is of Yorkshire parpoints coursed, the dressings of yellow Stourton and Grinshill stone, the internal stonework being Bath stone. The chancel is apsidal. The architects were Messrs. T. D. Barry and Sons, Church-street, Liverpool; and the contractor was Mr. Hugh Yates, of Liverpool.

GRAPPENHALL.—The parish-church of Grappenhall has been reopened, after restoration by Messrs. Paley and Austin, of Lancaster. The church has been entirely re-roofed, and the clerestory raised. The whitewash and plaster which covered the pillars and interior walls have been removed, and the stonework now stands out quite sharp and defined. In the course of restoring the church there was found lying near the base of the second pillar from the west end, and three or more feet below the floor, which had been raised above the original level either when the church was rebuilt in 1539, or since, the ancient font of an older church—a venerable relic, which goes back to Norman, if not to times still earlier. The material is the red sandstone of the country; and carved in low relief there runs around it an arcade of semi-circular arches, without other ornament. The dimensions are:—From end to end outside, 2ft.



7½ in.; from side to side outside, 2 ft.; height outside, 1 ft. 6 in.; depth of basin, 10 in.; from end to end inside, 1 ft. 10½ in.; from side to side, 1 ft. 3 in. The whole floor of the church has been excavated, and concreted. The north transept and chancel have been rebuilt. The sum of £3,500 has been expended upon the work, and it is estimated that an additional £600 or £700 will be required to reseat the church, put up a new clock in the tower, and carry out one or two other minor alterations.

**LIVERPOOL.**—The new Seaman's Orphanage Church at Newnham-park, Liverpool, was opened last week. The architect of the building is Mr. Alfred Waterhouse, of London, from whose designs the orphanage was also erected; and the builders Messrs. Haigh and Co., of Liverpool. Accommodation has been provided for 400 children, the full number intended to be admitted to the orphanage, and 320 visitors. The plan consists of a nave with central passage, transepts, and chancel. The external walls of the building are of grey brick, with an admixture of red Runcorn stone in the plinth and window-cills and jambs; and of red terra-cotta in the cornices. Internally, the brickwork of the walls above the dado, which is formed of cement, is visible, and is relieved by bands of dark grey terra-cotta and red Runcorn stone.

**TWICKENHAM.**—On Monday the Duchess of Teck laid the foundation-stone of the new church of St. Stephen, Twickenham. The cost of the building is estimated at £8,500. The church, as designed by the architects, Messrs. Lockwood and Mawson, of Lincoln's Inn, will be of the Perpendicular style of architecture. It will consist when completed of a nave, aisles, transept, and chancel, but it is proposed to build only the nave and chancel at first. The material will be Kentish rag faced with Bath stone.

#### BUILDINGS.

**LONDON SCHOOL BOARD.**—The members of the School Board met on Wednesday for the first time in the new offices of the Board, which are situated on the Victoria Embankment. The site upon which the new offices are erected is a portion which has been reclaimed from the low shores of the river, and which consequently afforded a very poor foundation. A considerable amount of concrete was necessary, and for the fronts piling was found desirable. From delays which have occurred in the construction of the building, and the necessity of its being occupied at this time, much of the interior work has still to be done. The style of architecture employed is Renaissance, of a somewhat early type. The front is built of Portland stone, with bands of red brick. The board-room is vaulted, and its walls are panelled with oak. There is a vestibule in the centre of the building, which lights the staircase and passages, and forms a convenient waiting-room, &c. The architects are Messrs. G. F. Bodley and T. Garner, of 14, South-square, Gray's-inn, and the contractors are Messrs. Cooke and Green, Mr. Nicol acting as clerk of the works. On the ground-floor there is accommodation for the general clerks, and for the Works, the School Management, the Bye-laws and the Finance departments. There are also rooms communicating with each other for the chairman and vice-chairman of the board, and the clerk of the board. On the first floor are the board-room, three committee-rooms, and rooms for the lady members of the board and the clerk of the board. The board-room, which is at the rear of the building, is 50 ft. long, by 29 ft. wide, and 27 ft. high. Its cubical contents are 37,800 ft. The whole of the stone and wood-carving in the building was executed, under the direction of the architect, by Mr. W. Aumonier, of Hampstead-road.

#### SCHOOLS.

**CLERKENWELL.**—On the 12th March, 1873, the London School Board accepted the tender of Mr. W. Wigmore for the erection of a school in Eagle-court, St. John's-lane, Clerkenwell. According to the terms of the contract, the school should have been completed on the 25th December last. Making every allowance, however, for delays which have occurred from circumstances beyond the control of the contractor, the Works Committee of the Board are of opinion that the delay in the erection of the school has been excessive, and state that the pressure which has been brought to bear upon Mr. Wigmore has had little or no effect. Acting on the recommendation of the Committee, the Board on Wednesday last resolved to instruct the solicitor to serve

upon Mr. Wigmore a notice terminating the contract.

**HULL.**—The memorial-stone of new schools at Keyingham, near Hull, was laid on Wednesday week. The schools, which are to accommodate about 120 children, consist of a mixed school for boys and girls, a room for infants, together with a boardroom and teacher's residence. They are constructed of Wallingfen white bricks, with dressings of red stock bricks from Hedon. The roofs are open-timber framed, of hammer-beam construction, and a bell-turret over one of the entrances will form a principal feature of the design. The design for these schools, which was selected in open competition last year, is by Mr. Robert Clapp, of Hull, and Messrs. Atkinson and Son, of Sproatley-in-Holderness, are now carrying out the works under his direction.

**LONDON.**—An interesting statement as to the work of the London School Board was made by Sir Charles Reed, the chairman, at the meeting of the Board on Wednesday last, at the new offices of the Board on the Victoria Embankment. He stated that 65 of the new and permanent schools of the Board had already been opened, accommodating 61,987 children; that 35 permanent schools were now in course of erection, giving accommodation for 26,736 children; and that the Board has taken steps to secure sites for 34 other permanent schools, to accommodate 24,000 children, making a total number of 134 permanent schools built, building, or arranged to be built, and accommodating 108,930 children. All these schools (with the exception of 28 erected from the designs of various architects) have been erected from plans by the architect of the Board, Mr. E. R. Robson, and the average cost per head of the 65 schools already built has been £9.13s. 4d., a figure which, as Sir Charles Reed remarked, contrasts very favourably with the cost per head of Board schools in some of the provincial towns, particularly when it is considered that the Board has more than met the requirements of the Government department as to cubic space, ventilation, &c. The Board is also to be congratulated on the statement made by Sir C. Reed that in the course of the erection of the sixty-five large blocks of buildings already opened by the Board, there has been no loss of life nor any serious accident. From the following figures it will be seen that the tendency to erect large schools is increasing. Six of the Board's permanent schools are planned to accommodate 250 children; 23 for 500 children; 25 for 750 children; 43 for 1,000 children; 32 for 1,250 children; and 5 for 1,500 children and upwards.

#### CHIPS.

The memorial-stones of the Heath Memorial Chapel, Crewe, were laid on Tuesday week. The building will be in the Norman style.

The foundation-stone of a new Congregational Mission Chapel was laid at Hunslet last week. Mr. Charles Fowler is the architect, and the building will cost £1,250.

An International Exhibition has positively been decided upon in China, and a committee formed at Shanghai for the purpose of organising it, with the English Consul as its president. Messrs. John Bourne and Co., of Mark-lane, have also been chosen as agents, so as to give every guarantee to European exhibitors. All charges of transport will be defrayed by the committee.

Mr. Warren Lindley, architect, of Leicester, died on the 19th ult., in his 73rd year.

A new theatre is about to be erected at Grant-ham. Messrs. Pattison, of Ruskington, are the builders.

A porch has been added to the Wesleyan Chapel, at Wigston, and other improvements effected. The building was reopened on Sunday week.

At a meeting held in Glasgow, on Wednesday week, it was agreed to accept the offer of the Government to grant a royal commission to inquire into the most effectual means of purifying the Clyde.

A new Congregational chapel has been opened at Rugeley. Messrs. T. and H. Brown are the architects.

For neglecting to whitewash and remove the wall-paper at a house in Liverpool, where four children had recently died from scarlet fever, the landlord has been fined 40s. and costs.

The death is announced of Mr. W. Denis-Moore, Town Clerk of Exeter.

The plans, elevations and sections, with specifications, for the new St. Paul's Schools, Penzance, have been returned, approved. The schools accommodate 250 girls and infants. The plans are designed by Messrs. Trounson and Son, Penzance.

#### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the page allotted to correspondence.]

To OUR READERS.—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

#### ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 9d. per line.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

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(Payable in advance.)

Including two half-yearly double numbers, One Pound per annum (post free); to any part of the United Kingdom. To the United States £1. 6s. 6d. (or 6 dols. 40c. gold). To France or Belgium, £1. 6s. 6d. (or 32 francs 60 centimes). To India (via Southampton) £1. 16s. To any of the Australian Colonies, New Zealand, the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1. 6s. 6d.

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Cases for binding the half-yearly volumes, 2s. each.

Subscribers receiving their copies direct from the office are requested to observe that the last number of the term for which their Subscription is paid, will be forwarded to them in a coloured wrapper, as an intimation that a fresh remittance is necessary, if it be desired to continue the subscription.

RECEIVED.—R. C.—T. T.—J. B.—W. E.—H. C. B.—W. B.—T. M.—C. G. and Co.—J. D.—M. and Co.—G. H.—P. and Son.—A. W.—H. J.—W. and Co.—L. and Co.—W. G.—A. T.

S. DE MORGAN.—Drawing returned; the subject was illustrated some years back in the BUILDING NEWS.

## Correspondence.

### HASTINGS TOWN-HALL COMPETITION.

(To the Editor of the BUILDING NEWS.)

SIR,—“Verbum sap” and “Verbum sat” are excellent aphorisms. Will the Corporation of Hastings consider them? They ask for a building to cost £12,000 which will cost nearly £20,000, and, unless professionally advised, may select, on account of low estimate, a design unsuited for the purpose—possibly one constructed of concrete, or with a roof too strong for the walls, as in the case of another Town-hall erected, where the equilibrium of forces had to be readjusted under the direction of another architect.

The best way to avoid such difficulties is to secure professional advice in the examination and selection from the whole of the drawings submitted—a course which I feel sure the majority of the competitors will approve.—I am, Sir, &c.

AN OLD SUBSCRIBER.

### THE ASPHALTE CLEANSING COMPETITION.

SIR,—Allow me to raise another voice in the general wail of the aggrieved competition slaves, and to call attention to the now almost forgotten Asphalt Competition. Nearly twelve months have elapsed since the advertisement appeared, and I, with about sixty others, am patiently waiting for the verdict. Will it ever come? or shall we vote its being placed upon the weekly increasing black list? Perhaps they are not able to award the premium, as the office-keepers may have (thinking it all settled long ago) appropriated the pretty little tops and painted pictures for their children. If so, let the committee own it, and no doubt the competitors will supply another design.

This is not chaff; for letters can be shown from the secretary, modestly asking whether certain competitors would feel inclined to have a machine constructed to try it fairly on its merits. A rough machine was estimated to cost about £60, add to this £10 for time, expense, and brains already laid out, total £70. With a chance of gaining £52. 10s. ! Need more be said?—I am, Sir, &c.,

HAD THIS TIME.



## THE LONDON HOSPITAL SATURDAY FUND.

SIR.—As Hospital Saturday is now so close, I feel assured you will kindly accord to it the support of your invaluable journal; and with this view I respectfully ask that you will permit me to inform your readers that the Directors of the Crystal Palace have arranged a Fête for the benefit of Hospital Saturday on the 5th of October next.—I am, Sir, &c.

WALTER J. THICKE, Assistant Secretary.

## Intercommunication.

## QUESTIONS.

[3479].—**Lightning-Conductors.**—Is a lightning-conductor safe (i.e. effective) unless fixed vertically, or nearly so? I notice that the conductor affixed to the principal tower of the Congregational Memorial Hall, Farringdon-street, after being brought down to the base of the tower, is carried along horizontally for a distance of 12ft. or 14ft., and thence down one of the main walls of the building. I presume the architects, Messrs. Tarring, are satisfied as to the safety of this mode of fixing a lightning-conductor?—DELTA.

[3480].—**Sewer Gases.**—Will any correspondent tell me the best means to prevent the bad smell arising from an air-shaft to a sewer? The gulleys in water channel are not trapped, and bad smells arise from them also.—ENTERPRISE.

[3481].—**Benches.**—In the account of the Association Excursion (BUILDING NEWS, Sept. 4), I observe a notice of an arrangement of benches with sliding ends, at Anvers. Would some gentleman acquainted with this contrivance oblige me with a rough sketch and description of it?—PINKIE.

[3482].—**House in Perthshire.**—In the illustration of the foregoing, last week, there are no external down-pipes indicated. Would Mr. Leiper inform me how he conveys the rain-water from the gutters?—PINKIE.

[3483].—**Archæology.**—Can a correspondent give me the name of any work treating on the archæological history of Lambeth, or any other part of South London?—G. H.

[3484].—**Curved Girders.**—I am in want of a good treatise, of recent date, treating upon curved braced girders. Can any correspondent enlighten me?—STUDENT.

[3485].—**Shearing Strain.**—Can any one show me how this is obtained in a Warren girder?—STUDENT.

[3486].—**Mouldings.**—Can any reader describe the simplest and most effective moulding for a cornice to a room of small size?—TYRO.

[3487].—**Adjusting Dumpy Level.**—What is the best method of putting an ordinary "dumpy level" into adjustment? If any correspondent can explain clearly and concisely the method adopted by mathematical instrument makers, he would not only confer a benefit upon me, but upon others who are similarly situated.—COLONIST, A.C.E.

## REPLIES.

[3429].—**Duties of Land Steward.**—There is no manual of any value to "A. J. S." at present in print. He will find what he requires in the works of Bailey Denton, Dean, and Scott Burn, and in the Report of the Yorkshire Agricultural Society, sold by Ridgway, of Piccadilly.—M. E. A. C.

[3435].—**Strength of Tee Iron.**—The formula I gave was approximate, as of course the strength would depend on the proportion of the upper flange to the web. A girder of T section is considerably weaker than one double-flanged, as the effective strength to resist the strain would be in the web, the upper flange acting as a fulcrum. The neutral axis of such a beam would be somewhere close to the underside of flange, and therefore the web would come in for the greatest share of the resistance, which would, in fact, be measured by the leverage from the neutral axis to the under edge of web. The upper flange being in compression, takes its portion of the resistance, but it is small and immaterial. In cast iron this form of section is still less effective, owing to the inequality of the resistance of the material to tension and compression. Some experiments made by Hodgkinson upon them showed that, when the flange was placed downwards, sustaining tension, the strength was three times as much as when the thin part of the rib was in tension, though the deflection in both cases was the same.—G. H. G.

[3438].—**Lattice Girders.**—My reply, which "G. P." fancies incorrect, had reference to strains on the lattices, as he may have easily inferred, as I gave him the formula for the strains on flanges previously, and repeated it in my last reply. In a girder supported at both ends, and loaded in the centre, the greatest strain on flange of course is in the centre, decreasing to nothing at the points of support. With the lattices, this is reversed; the least strains are on the lattices in the middle. In my last reply "G. P." will find all the formula required. If "G. P." wants in addition the strains on either flange caused by a rolling load as a railway train, the formula will be,  $\frac{Wx(l-x)}{ld}$  = strain

at any point; W being the concentrated rolling load,  $x$ , distance of strain from support;  $l$ , span;  $d$ , depth of girder, centre to centre of flanges. "G. P." thinks I have ignored his remarks as to the distribution of strain in different kinds of bracing. Of course this depends on the kind of bracing, and I do not think I said anything about the strains evolved, as they will entirely result from the mode of construction, and the manner of loading, whether on one or both booms. Verticals distribute the load, and the strains are generally equal in this case, also when the load is divided between the two booms.—ARCHITECT.

[3445].—**Moment of Rupture.**—While thanking "G. P." for his offered correction, I prefer to allow the formulæ to stand as I had them. He does not appear to have regarded the original question of "Student," for which question my reply was intended. He will there see the question put was to find the "moment of rupture" at any point of a loaded beam, and the reply was also headed the same. But "G. P." objects to the word "strain," and says there is a great difference between the "moment of rupture" and the "strain." This idea is more a fancied difference than a real one. The word "rupture" implies strain, and it is perfectly right to use the latter term; indeed, it is more comprehensible, which is the reason I used it. The meaning of "moment of rupture" is really the moment of strain, i.e., the leverage or moment of the weight about a certain point. Thus, in a beam, the strain is said to be proportional to the distance of the weight from the point, and in a beam of equally distributed load, supported at both ends, the strain or

moment in centre =  $\frac{1}{8} WL^2$ , W being taken as

the weight distributed per unit of length, and L the length of beam, the strain in this case being only half that when the weight is in the centre of beam. Taking a flanged girder, the strains will vary throughout the flanges as the moments of rupture. It will not do to allow a technical term to obscure the actual meaning. I am obliged to "G. P." for correcting the misprint.—ARCHITECT.

[3449].—**Rain-water Tanks.**—Let "Aqua" ascertain (1) the average rainfall of his district; (2) the average number of rainy days in the year; (3) the area of his roofing; and then provide for as many days' rain as his judgment suggests. Or, taking the number of the inmates as a basis, he may provide sufficient for a six weeks' consumption in the summer season, allowing 10 gallons per dlem per head. It is difficult to answer such a vague question as "Aqua's," seeing that the amount of storage will vary according to the uses for which the rain-water is required, as well as the district rainfall. He will find a coarse filter of gravel and sand, for the cleansing of the water before its entrance to the tank, a great improvement.—M. R. A. C.

[3451].—**Windows.**—The principle involved in the law regarding overlooking lights is one resting upon moral right. Why should a neighbour wish to obtain light by an inconvenience to his neighbour? Not only this: the insertion of windows would, in course of time, become a right, and could be maintained, and the adjoining proprietor would, in all probability, be restrained from building, or from depriving his neighbour of light.—G.

[3452].—**Boundary Wall.**—A boundary wall is a matter of interest to both adjoining neighbours.—G.

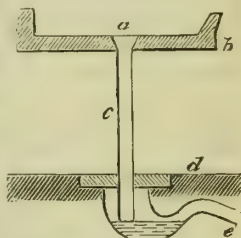
[3460].—**The Pointed Arch.**—In reply to "Ignoramus," the pointed form of arch is now admitted to be of considerably greater antiquity than generally supposed. Mr. Hoskins found pointed as well as circular arches in Ethiopia in the porches of the pyramids of Meroë. At Nimroud an arched drain beneath one of the palaces existed, and is shown by Fergusson; and the Assyrians are credited with the use of the pointed arch in their tunnels, showing they understood the best form for resisting pressures at the crowns of their vaults. The pointed form of arch is found also in the sepulchral chambers at Mycenæ, and has been traced in Greece, Etruria, Asia Minor, and appears to have been prevalent among the Pelasgians. Sir G. Wilkinson has shown its use in early Christian churches, and Mr. Fergusson has shown its employment in the church built in Constantine's age over the tomb of our Saviour at Jerusalem. The last writer, indeed, has sufficiently established its existence long prior to the Moslem domination, and that the Saracenic architects used it from the commencement, and were not the original inventors, as some have asserted. These facts point to a date at least coeval with the mythical age of Greece, if not, indeed, with that of the Egyptians.—G. H. G.

[3468].—**Strength of Arch.**—"Subscriber" wishes to know the amount of weight an arch 10ft. span, of segmental form, 2ft. rise and 2ft. thick, will carry without fracture? Presuming the abutments are sufficient to resist any pressure, I should find the amount of weight the arch can bear in the following way. Draw a straight line from the crown to the abutment within the thickness of arch ring, and that will represent an inclined beam bearing so much crushing strength for the material; and the vertical component, or the vertical line from the crown to the horizontal or springing line, will represent the load such an arch can bear safely at the crown. I do not know the crushing strength of the grit-stone, but I should think it would well bear, if the abutment were strong enough, 40 tons.—G.

[3471].—**Trap for Sink.**—The ordinary bell-trap are exceedingly unsuitable for sink traps, because servants will insist on removing the grating when the drainage of the water through the grating is checked by tea-leaves and other like impedimenta; the effect of this removal is to introduce into the drain large quantities of improper matter which sometimes stop it up altogether, and to destroy the trapping quality of the so-called trap by the removal of the bell with the grating. Indeed, I have seen the sink in the basement kitchen of a well-known writer on house drainage and other sanitary matters, with the bell-trap top off and lost, and an unchecked draught of sewer-gas rising through the waste-pipe with sufficient power to blow out a lighted candle when applied. The most perfect traps are Anthill's patent lead D traps (the gratings of which are not readily removed, except with the use of keys sold with the traps) and Tye and Andrews' galvanised iron siphon trap (which has a screwed boss at bottom of bend, adapted for occasional removal for cleansing). If Anthill's trap is used, it should be rather larger than the ordinary bell-trap which would be chosen for the same purpose, and never less than 3½ in. diameter. Neither of these apparatuses have their trapping properties suspended during the absence of the grating. The safest plan is to abstain from connecting the waste-pipe with the drain, and to deliver it in the open air over a yard-trap sunk an inch or two in the paving; still, however, using the trap in the sink to prevent any smell from the foul attachments of the interior of waste-pipe. Or the waste-pipe may be connected into a stoneware gully-pan under the paving outside the house, or into a patent Redcliffe stoneware trap, manufactured somewhere in Brompton, and, I believe, used for collecting and trapping in one receptacle the soil-pipe, rainwater-pipe, yard-trap, and kitchen sink, and having a proper arrangement for the ventilation of the drain.—L.

[3471].—**Trap for Sink.**—We note the inquiry by "Inquirer" in your last issue, and beg to bring under his notice our new improved double trapped yard gully. Further information can be had from us.—H. SHARP AND JONES, Bourne Valley Wharf, Nine Elms.

[3471].—**Trap for Sink.**—I have always found the following trap effectual, simple, easily cleaned of grease, &c.; and, moreover, it has the advantage of being cheap, and prevents any refuse going down waste pipe.  $a$ , 4 in. brass grating soldered to pipe;  $b$ , stone sink;  $c$ , 2½ in. pipe;  $d$ , floor-line;  $e$ , 4 in. earthenware trap under floor, connected to drain. Trap being under floor, cannot be tampered with unless by proper workmen. Waste-pipe dips into the water, preventing smell; it can also be double-trapped if required.—THOMAS.



[3472].—**Angle of Repose.**—In reply to "Q. P.," he may use an angle of 50° for compact earth; if wet, not more than 25°.—G.

[3473].—**Cement Face.**—Parlan or Keene's cement gives a good surface, and will bear a polish.—G. H.

[3474].—**Lattice Girders.**—The strain on the lattice bar is simply multiplied by the sine of the angle it makes with the vertical; or Strain  $\times \sin \phi$ ; or it will be, Strain  $\times \cotan$ . angle 50°.—ARCHITECT.

[3477].—**Japanese Ink.**—I would recommend "Draughtsman" to rub down his ink as usual, and then add a little of Syke's indelible water, procurable, I believe, from Messrs. Winsor and Newton. The drawing may afterwards be coloured without the slightest fear of the ink washing up.—E. J. HUBBARD.

## STAINED GLASS.

BRIGHTON.—A stained-glass window, to the memory of Mary Ann and Charles Calley, has just been placed near the chancel in the south aisle of St. Patrick's Church, Brighton. The window, which has been designed by Butterfield and executed by Gibbs, represents our Lord after the Resurrection.

EDINBURGH.—A memorial-window has been erected in the north aisle of St. John's Episcopal Church, Edinburgh. The design contains in the centre light an illustration of our Lord holding in one hand a book with the inscription "Alpha and Omega," and in the other a cruciform sceptre. The two side-lights are illustrated by angels bearing texts. Messrs. Ballantine and Son are the artists.

## STATUES, MEMORIALS, &amp;c.

ABERDEEN GRANITE MEMORIAL.—A very handsome Aberdeen grey-blue granite memorial has just been completed for Mrs. Wicks, of Syracuse, U.S., America. It is in form a Gothic archway, and is to be the entrance to the burial lot of the late Mr. E. B. Wicks, banker, in Oakwood Cemetery. It is composed of nineteen pieces of polished and unpolished granite, and is about 17ft. high by about 11ft. broad. The arch is composed of one large stone. The whole work has been done in a very tasteful and elegant manner,



and reflects great credit on both architect and sculptor. Mr. A. Russell, of Syracuse, supplied the design and the working drawings, and the whole of the granite work was executed by Mr. Legge, sculptor, Granite Works, Aberdeen.

**BRADFORD.**—The Lister Statue is shortly to be erected just inside Lister Park, Bradford. The figure, which is 10ft. high, is of white Sicilian marble, and represents Mr. Lister standing erect, with a 2ft. rule in his right hand, and his left resting on a scroll of paper on a pedestal. The figure stands on a block of marble 3ft. high; at each side of this block are scattered emblems of Mechanics. These rest on a light-grey polished Aberdeen granite pedestal of novel form, the front and back being square, and the sides circular. In the plain part are inlaid bronze bas-reliefs; that to the front represents Mr. Lister's latest invention, viz., the velvet-loom. One of the circular side panels contains a good representation of the old wool-comber's cottage.

**STATUE OF BALFE.**—A statue, erected by public subscription in the vestibule of Drury Lane Theatre, London, in honour of Balfe, the composer, was unveiled on Friday last by Sir Michael Costa. The statue is a full-length figure, standing 7ft. high, and the pedestal is 6ft. high. The artist is Malampre, a young Belgian, a pupil of Baron de Triqueti. The cost is somewhere between £800 and £900. Balfe is represented as leaning against a pile of his works, and in his right hand holds a pencil, in his left a bundle of music.

#### WATER SUPPLY AND SANITARY MATTERS.

**BRECHIN.**—In the beginning of the present year the Police Commissioners of Brechin resolved to proceed with a plan furnished by Mr. Gale, C.E., Glasgow, for procuring an additional supply of water for the burgh. The source selected was the burn of Mooran, which rises in the Grampian range, about seventeen miles distant from Brechin. The water is brought from about six miles in 10in. fireclay pipes, and for about other five miles to the reservoir in 8in. cast-iron pipes. The supply, it is estimated, will never be less than 500,000 gallons per day, being at the rate of 340 gallons a day per head of the population. The expense of the scheme is expected to amount to about £15,000, which will entail an assessment of 1s. 4d. per £1. It is thought that the formal turning on of the water to the town will take place about the 10th inst.

**PONTEFRAC.**—On Monday last the first brick of a new reservoir capable of containing from 350,000 to 400,000 gallons of water was laid by the Mayor. The excavations have been completed by Mr. Isaac Marsh, contractor, Castleford, and the contract for laying pipes, &c., has been taken by Messrs. Speight and Sons, Leeds.

**THE LONDON WATER SUPPLY.**—The average daily quantity of water supplied during the month of August, 1874, was, according to returns, 127,649,728 gallons, or 579,971 cubic metres of water (equal to about as many tons by measure, tons by weight), or 24.9 gallons (113.1 decalitres), rather more than a ton by weight to each house, and 35.1 gallons (15.9 decalitres) to each person, against 35.2 gallons during August, 1873. It is estimated that during the year 1866 about 82 per cent. of the total supply of water for all purposes was for domestic use: applying this proportion to the total quantity supplied daily in the month of August, 1874, it may be estimated that about 104,672,777 gallons were used for domestic purposes, or about 28.8 gallons per day for each inhabitant, against 28.9 in the corresponding month of last year. The return for August, 1874, as compared with that for the corresponding month of 1873, shows an increase of 7,635 houses, and of 1,409,518 gallons of water supplied daily.

**TWICKENHAM.**—At the last meeting of the Twickenham Local Board, the contract for the execution of the first portion of the works necessary for the diversion of the sewage from the Thames was signed and sealed. It was stated that the works were progressing satisfactorily.

#### LEGAL INTELLIGENCE.

**THE LAW OF FENCES.**—At the Welshpool County Court a case has been tried which turns upon the law of fences. John Evans sued Humphrey Gardiner—whose land adjoins his own—to recover £6 damages, alleged to have been done by cattle belonging to the latter having broken into the land of the former. The judge, Mr. Homersham Cox, said he had decided at least a dozen times that a man was not bound to keep up fences at all, and as regarded prescriptive obligation to repair fences, it had been held that proof of a user of right for twenty-eight years was not evidence of this. It might as well be said that a man was bound to keep his door shut to prevent intrusion as that he was bound to fence his field to prevent other people's cattle coming upon it. To maintain this would lead to ridiculous results, as if a man must put up fences to prevent cattle coming in, why should he not be compelled to raise them higher to keep fowls out, and to cover his land altogether to prevent pigeons coming in? On the authority of *Boyd v. Tamblin* he held, therefore, that a man was bound to keep his cattle from trespassing on his neighbour's land, and should hold, until he was corrected by a superior court, that it was the duty of an owner to keep his cattle from doing damage,

although there might be a special or prescriptive custom to maintain fences. Besides, there could be no prescription between co-tenants, which plaintiff and defendant were.

### Our Office Table.

**THE DESIGNS FOR THE NEW TOWN-HALL AT HASTINGS.**—The plans and drawings which have been received from those desirous of gaining the three premiums offered by the Town Council are from 35 different persons. It was only on Wednesday that they were unpacked and inspected by the Town Hall Site Committee. It is understood that the designs will be kept private until some decision has been arrived at. The competitors are by no means altogether residents at Hastings, many of the packages having arrived from the metropolis and the provinces. It has at present been decided to keep even the mottoes of the competitors secret.

**ST. PANCRAS WORKHOUSE.**—At the meeting of the St. Pancras Guardians, on the 24th ult., the Visiting Committee reported that Mr. H. H. Bridgman, architect, had submitted the completed plans of the proposed alterations and additions to the workhouse building, with his estimate. It was resolved to report to the Local Government Board that the guardians had approved of the proposed infants' and lying-in wards in the place, and that they were prepared to carry out this portion of the plans. The guardians found that the plans as first proposed by them had been completely reorganised under the influence of the consultations with the inspectors and architect, and that these alterations involved an additional outlay of about £6,000. The guardians, therefore, did not feel justified in incurring this large extra expenditure; they were, however, willing to carry out their original plans, which would not involve so large a cost. The architect's estimate of the total cost of carrying out the plans as revised is £20,000, and the guardians were not prepared to spend so large an amount upon these alterations and additions, and they would be glad, therefore, if the Local Government Board would reconsider and approve of the plans originally contemplated by the guardians. The report was adopted.

**MUNICIPAL GOVERNMENT OF LONDON.**—A Bill for improving and consolidating the municipal government of London will be introduced into Parliament next session by Lord Elcho. The Bills introduced by the late Mr. J. S. Mill and Mr. C. Buxton were divided into three heads—one to create several metropolitan municipalities, another to create a municipality in chief, a third to extend the county of the City of London over the whole metropolitan area. It is stated that these are now in the hands of an eminent draughtsman, to reduce the three to one Bill, dealing in a new form with the same question, viz., simply extending the ancient and historic corporation of the City of London over the whole area of the metropolis, and providing for new wards and representatives for the entire area. The Metropolitan Board would be joined to the City Corporation, and, it is presumed, bear the same relation to it as the City Commission of Sewers does at present. The City Commission of Sewers would then, of course, be dissolved. This is a very important scheme, and one beset by many difficulties, which it is certain will not be readily removed by the present Corporation.

**THE GAS SUPPLY OF LONDON.**—Consequent on the erection of the very extensive gasworks at Beckton, near Barking, the gasworks at Blackfriars-bridge and Horseferry-road, Westminster, will shortly be removed, and the sites sold in aid of the reduction in price of gas. In order to supply the very large district hitherto served by the Company (constituting, it is said, three-fifths of the whole of the Metropolis, and including the City and West End), enormous gas mains are being laid down from Beckton to London. (Beckton is about eight miles from the Bank of England.) In the Commercial-road East the diameter of the main is 4ft., diminishing, of course, as the western portions of the district are reached. Application has been made to the Metropolitan Board of Works to lay one of these mains, 3ft. in diameter, in the subway beneath the Victoria Embankment. These large mains have been adopted by the Company to enable them to supply an ample quantity of gas at a

lower pressure, so as to result in economy to the consumer, and to reduce to a minimum the leakage in the mains. With these large low-pressure mains the waste by leakage is not anticipated to exceed ten per cent., whereas the adoption of smaller mains and the high-pressure system would, it is said, entail a loss by leakage of from 35 to 40 per cent. Of course, the work of laying these monster mains will play sad havoc with the roads, which, we suppose, will have to be submitted to, especially if the result is seen in an improved and cheaper supply of gas.

**RESTORATION OF OIL PAINTINGS.**—Oil paintings are made with siccative linseed oil colours, and, when dry, covered with a thin resinous varnish. Aside from the incurable darkening by age, they are subject, in the course of time, to two diseases conditioned by the oil employed, and which are capable of improvement. By too hard drying the paint contracts, and covers the picture with numerous cracks, which can be rendered invisible by tediously filling them up with fresh paint. Besides this, it also happens that the film of varnish which was originally strong and transparent, is traversed by innumerable fine cracks, which render the picture indistinct. Prof. Pettenkofer, of Munich, was the first to devise a simple method to render the varnish transparent again. He placed the picture, painted side down, on a vessel containing absolute alcohol. The ascending vapours condensed on the surface of the picture and rendered the varnish to a slight degree soluble, so that the parts flowed together and the flaws disappeared. The operation was somewhat inconvenient, since it was impossible to watch the operation directly, and the picture had to be frequently turned over to ascertain the point at which the restoration seems complete. Eimerling, of Augsburg, conducted warm alcoholic vapours directly upon the picture; this action is frequently too strong, and may injure the paint. Dr. Weigelt has devised a third method, which does not act so violently as the above, yet, like that, permits its direct observation, and can be conducted just as far as desired. A vessel filled with alcohol is gently warmed, and air is blown through it with a bellows or other contrivance. The air is impregnated with alcoholic vapour, and is conducted through a tube directly upon the picture. In this way much less alcohol is brought upon the picture than in the preceding method, and the results are said to be excellent.

**DEATH OF MR. WILLIAM CULSHAW.**—The late Mr. William Culshaw, whose death, after a painful illness, we regret to record, was for many years the leading surveyor in Liverpool, and enjoyed a good architectural practice. The son of a small joiner and builder in Ormskirk, Mr. Culshaw went to Liverpool about forty years ago, and entered the office of Messrs. Leather and Riding, who had an excellent practice as building surveyors. On the death of the junior partner, at the time the firm were engaged on erections for the late Mr. Launcelot Graham, Mr. Culshaw was retained by Mr. Graham as clerk of works, and gave that gentleman so much satisfaction that he was ever after consulted exclusively by him and his sons, and a grandson served his articles in Mr. Culshaw's office. From the period referred to Mr. Culshaw's progress was continuously successful. Not having enjoyed an architectural training, Mr. Culshaw had little taste for architecture, and his practice, therefore, must be regarded as purely appurtenant to his employment as a surveyor. He had an extensive practice, chiefly in counting-houses, workhouses, and private residences, his works of more artistic character being due to the period since he enlisted the services of Mr. Sumner, first as manager and subsequently as partner. To that date are to be assigned the National Bank in Cook-street, and the buildings of the Law Association; the Southern Hospital, the Savings' Bank in Bold-street, Christ Church, Sefton Park; and some other works of similar character.

**SUSSEX IRON.**—An effort is being made to restore to the county the ancient ironworks that formerly abounded, but which disappeared on the use of pitcoal in the north for iron smelting. "Impossible as it may seem," says the *West Sussex Gazette*, "the revolution of time is operating to bring again the splendid deposits of iron in Sussex once more into notice. The iron deposits of the Wealden district are amongst the most extensive in the kingdom, and although perhaps not the richest in the percentage of metal, are most valuable for their purity. The



drawback has hitherto been the cost of fuel, but recent discoveries having overcome this obstacle, there is now no reason why the smelting of iron should not be resumed. Although chalk may not possess any intrinsic heat, yet it does contain a very large percentage of a gas which has, in combination with carbon, the most reductive action on oxide of iron, and is, in fact, the active agent in existing blast furnaces. As the chemical action is not dependent on the sources whence the gas is obtained, but on its chemical properties *per se*, it results that this gas can be as readily obtained from chalk as from coal, and the chalk, which has been well-named 'white coal,' may come to play an important part in history. The construction of present blast furnaces is admittedly defective, being based on the old rule of thumb, but the introduction of practical chemistry has opened up a new field, which bids fair to render available the mineral wealth of Sussex after a sleep of two centuries." Several of the nobility and gentry of the county are subscribing towards the cost of an experimental furnace intended to inaugurate the desired revivification of the Sussex iron manufacture.

**AN UNSUCCESSFUL SPECULATOR.**—Since the collapse of the South Hants Bank, some eight years ago, no failure has created so profound a sensation as that of Mr. J. S. Elliott, solicitor, of Portsmouth, and clerk to the sanitary authority, whose flight is announced. One of his principal creditors is a builder, who is a contractor for the erection of several school buildings under the School Board; and not the least disastrous result of Mr. Elliott's disappearance is that on Friday no less than 240 men engaged on these buildings have been thrown out of work. A solicitor in the neighbouring town of Fareham is a creditor for between £6,000 and £7,000. The claims of a firm of builders at Landport amount to £5,000. Another tradesman holds bills, it is said, to the amount of £7,000, and there are a great number of other creditors for smaller amounts. An application has been made to the magistrates for a warrant for Mr. Elliott's apprehension for forgery. The proceedings were strictly private, but it is stated that the magistrates refused the application on a technical objection. He has, however, been declared a bankrupt. The sole cause of Mr. Elliott's failure appears to have been speculation in building.

## CHIPS.

A new preaching-hall at Sandown, Isle of Wight, was opened on Sunday week. Mr. Joliffe is the builder.

The memorial-stone of the new All Saints' Church Schools at Wokingham was laid on Thursday week. The schools will accommodate 400 children, at a cost of £2,500. Mr. J. Morris is the architect, and Mr. Maynard the builder.

The foundation-stone of the new Municipal buildings at Reading will be laid on Thursday next.

The Congregational Chapel at Thatcham has been reopened, after restoration by Mr. T. Bailey, from designs by Mr. H. Flint, jun., architect, of Newbury.

St. Saviourgate Unitarian Chapel, York, was reopened on Sunday week, after restoration, under the superintendence of Messrs. Atkinson, architects.

A new carillon or chiming machine has lately been fixed in the parish-church, Leek, by Messrs. Gillett and Bland, of Croydon.

Mr. George Treacher has received from the Royal Institute of British Architects a certificate of competency to perform the duties of a District Surveyor.

A new dairy-farm is being erected at Acton for the Sanitary Milk Company. Mr. W. Bessie is the architect.

Mr. W. Broderick has been appointed Surveyor to the Swinton Local Board.

Mr. George Godwin, F.R.S., has resigned, through ill-health, the office which he has held for the last twenty-one years as District Surveyor for South Islington.

Mr. D. J. Humphries has been elected Borough Surveyor of Cheltenham.

The foundation-stone of a new public hall at Bervie, Kincardineshire, was laid last week. Mr. Coutts, of Laurencekirk, is the architect; the building will be 82ft. long, 33ft. wide, and 27ft. high.

A new Poorhouse and Asylum is being erected at Smithston, Renfrewshire. Mr. Starforth, of Edinburgh, is the architect.

The people of Derby, it is said, intend erecting, by public subscription, a statue to Mr. M. T. Bass, who has for thirty years represented the borough in Parliament.

A contractor and builder, named William Parsons, of Andover-road, Holloway—said to be in a large way of business—has a strong reluctance to support his wife. The magistrate of the Clerkenwell Police-court sent Mr. Parsons to the House of Correction, as an idle and disorderly person, for one month, with hard labour.

The work of taking out the foundations for the new Congregational Chapel in Queen-street, Newton Abbot, has been commenced, preparatory to tenders being invited. The building will be proceeded with very shortly. The architect is Mr. J. W. Rowell.

The Public Works Loan Commissioners have sanctioned the loan of £600 for the construction of sewerage works at Kingsteigton, Devon.

Anchmore House, Loch Tay, one of the seats of Lord Breadalbane, has just been restored, under the superintendence of Messrs. Peddie and Kinnear, architects, of Edinburgh.

A new north aisle is being added to St. Matthew's Church, Southampton.

New offices for the Hampshire Friendly Society have been erected at Winchester, from designs by Mr. T. Stopher, in the Tudor style.

The construction of new forts for the defence of Paris will be commenced in November. The works will give employment to 2,000 men.

The Town Council of York have decided to obtain Parliamentary powers to construct a bridge over the Ouse, at Skeldersgate Ferry, at an estimated cost of £31,000.

The large dining-room of the Albion Tavern, Aldersgate-street, is being redecorated by Mr. Burfoot, of White Lion-street, Bishopsgate.

A new reredos, by Clayton and Bell, has been erected in Bishop Burton Church, Yorks. It is constructed of Powell and Sons' vitreous material.

St. Giles Church, Northampton, is about to be restored, from designs by Mr. Law.

The entrance to the Great Western Railway goods Depot, in Smithfield, is being constructed some 20ft. further back than heretofore, and a new porter's lodge, smaller and neater in appearance than its predecessor, has been erected.

Various works are about to be carried out at the Church of St. Andrew Undershaft, at a cost of about £2,500. The works include new choir-stalls, a pavement in the chancel, with everything required in the sacristy, a new reredos, and a new east window.

The famous lion of Northumberland House was fixed on Wednesday on the top of Lion House, Isleworth, the residence of the Duke of Northumberland. It can be seen from the park at the back of the house as well as from the river.

The first ordinary meeting of the Society of Engineers for the session 1874-5 will be held on Monday next. A paper will be read on "Mechanical Puddling," by Mr. Perry F. Nursey.

Holy Trinity Church, Haverstock Hill, has recently been cleaned and decorated by Messrs. Manley and Rogers, builders, St. George's-road, Regent's-park. The designs for the decorations were supplied by Mr. J. Edward K. Cutts, architect, Waterloo-road, Hammersmith, the entire cost of the improvements being about £200.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHELVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB AND SON,  
Makers to the Bank of England,  
57, St. Paul's Church-yard, E.C.  
And 68, St. James' street, S.W.—[ADVT.] } London.

## Trade News.

## WAGES MOVEMENT.

DUNDEE.—The Dundee slaters have struck work, because their employers refuse to sign an agreement guaranteeing three months' employment.

THE NORTH WALES SLATE TRADE.—At a mass meeting of men who have remained at Bethesda, held on Tuesday evening, the strike committee submitted a reply delivered late on Monday night to the men's ultimatum of Friday. After reviewing the position of the dispute, the men are reminded that they consented to accept the decision on arbitration of Mr. Pennant Lloyd in cases affecting the working of the quarries, and are informed that Lord Penrhyn is ready to adhere to that arrangement, and substitute in Mr. Lloyd's absence Mr. Wyatt as arbitrator. Mr. Wyatt has written a letter declaring that he will impartially consider the alleged grievances which gave rise to the second strike, and asking for particulars. Lord Penrhyn positively refuses independent arbitration. The tone of Mr. Wyatt's letter was far from conciliatory, and had a visible effect upon the meeting, which insisted that Mr. Barber should be withdrawn from further deliberations, and that a secretary of their own should accompany their delegates in the interviews with Mr. Wyatt. The men are more resolute than ever, and unless his lordship makes considerable concessions the strike seems likely to be of long duration. Over 600 men have this week quitted the neighbourhood.

## The Timber Trade.

Wholesale prices of timber, deals, &c.  
At per load.

	s.	d.	s.	d.
Ash . . . . .	140	0	160	0
Quebec large birch . . . . .	110	0	160	0
Riga fir . . . . .	80	0	85	0
Pitch pine . . . . .	75	0	85	0
Baltic crown fir . . . . .	90	0	110	0
" best middling . . . . .	80	0	100	0
" good do. & 2nd . . . . .	75	0	90	0
" common middling . . . . .	70	0	80	0
" undersized . . . . .	55	0	65	0
Swedish . . . . .	58	0	68	0
Norway and Swedish balks . . . . .	40	0	55	0
Quebec yellow pine, large . . . . .	90	0	130	0
" waney board . . . . .	100	0	130	0
" small . . . . .	80	0	90	0
" oak . . . . .	160	0	180	0
Baltic crown oak . . . . .	110	0	160	0
Stettin fir . . . . .	60	0	70	5
Rock elm . . . . .	150	0	160	0

Per superficial foot.

Bird's-eye maple . . . . .	0	5	0	7
Italian walnut . . . . .	0	4½	0	5
Black sea . . . . .	0	3½	0	4½
Canadian . . . . .	0	3	0	4
Honduras Mahogany, cargo aver. . . . .	0	4	0	5
Mexican . . . . .	0	4	0	5
Tabasco . . . . .	0	5	0	6
Cuba . . . . .	0	7	0	10
St. Domingo . . . . .	0	7	0	10
" . . . . . curls . . . . .	1	0	2	0
Cuba cedar . . . . .	0	4½	0	5
Honduras and Mexican cedar . . . . .	0	3½	0	4½
Australian . . . . .	0	3½	0	4½

Per ton.

Bahia rosewood . . . . .	£	s.	£	s.
Rio . . . . .	12	0	18	0
Bahama satinwood . . . . .	14	0	20	0
	7	0	8	0

Per 120 12ft. 1½ by 11.

Wyburg, 1st yellow . . . . .	13	10	14	10
Quebec, 1st floated pine . . . . .	20	0	23	0
" 2nd floated . . . . .	15	0	15	10
" 3rd floated . . . . .	12	10	13	0
" 1st bright . . . . .	21	0	26	0
" 2nd bright . . . . .	15	0	17	0
" 3rd bright . . . . .	12	10	13	10
" 1st spruce . . . . .	13	0	13	10
" 2nd . . . . .	10	10	11	10
" 3rd . . . . .	10	10	10	15
St. John's . . . . .	10	0	11	0
Lowerport . . . . .	10	0		
Swartwick 1 & 2 yellow . . . . .	4	by 9	14	15
" 3rd . . . . .	3	by 8	13	15
" 3rd . . . . .	2½	by 9	14	0
Archangel, 1st white . . . . .	3	by 9	13	5
" 1st yellow . . . . .	3	by 11	17	5
" . . . . .	3	by 9	17	0
" 2nd . . . . .	3	by 9	13	10
" . . . . .	2½	by 7	13	10
" . . . . .	3	by 7	13	0
" 3rd . . . . .	1½	by 7	11	0

Pitch pine . . . . .			14	15
Gothenburg 3rd yellow . . . . .	3	by 9	13	10
Stockaviken, 1 & 2 . . . . .	3	by 9	15	0
" . . . . .	2½	by 7	14	10
" . . . . .	3	by 8	13	15
Way, 1 & 2 . . . . .	3	by 9	15	0
" . . . . .	2½	by 7	14	0
Soderham, 3rd . . . . .	3	by 10	14	0
" . . . . .	3	by 8	13	10
Hussum, 1 & 2 . . . . .	2½	by 7	14	15
" . . . . .	3	by 7	13	10
" 3rd . . . . .	3	by 9	14	5
" . . . . .	4	by 9	13	15
" . . . . .	3	by 7	12	15
Kotka, common . . . . .	2½	by 7	11	5
" . . . . .	2½	by 6	9	10

Narva, 3rd . . . . .	3	by 11	12	0
Akmar, 1 & 2 . . . . .	3	by 9	16	0
Christiana, 1st white . . . . .	3	by 9	12	10
Kotka, common . . . . .	3	by 9	9	15
" . . . . .	3	by 8	9	10
Gefle, 1 & 2 yellow . . . . .	4	by 9	14	10
" 3rd . . . . .	3	by 9	14	0
" . . . . .	3	by 7	13	0
" . . . . .	4	by 9	13	15
" . . . . .	3	by 9	13	10
" . . . . .	3	by 11	13	10

Holmsund, 1 & 2 yellow . . . . .	3	by 9	15	15
" . . . . .	4	by 9	14	10
" . . . . .	3	by 8	14	0
" 3rd . . . . .	3	by 9	14	0
" . . . . .	4	by 9	13	15
" . . . . .	3	by 11	13	10

Hudikswall, 1 & 2 . . . . .	3	by 9	15	0
" 3rd . . . . .	3	by 9	14	0
Way, 1 & 2 . . . . .	3	by 9	15	0
" . . . . .	2½	by 7	14	0

Per cubic fathom.

Riga lathwood . . . . .	8	0	8	5
Petersburg do. . . . .	10	10	10	10

Flooring per square foot.

Best yellow . . . . .	¾	by 6	12	6
" . . . . .	1	by 5	13	3
" . . . . .	1½	by 7	20	3
" . . . . .	1	by 7	15	3
Second . . . . .	1½	by 5	12	6
" white . . . . .	1	by 7	10	9



### WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay.—For samples and further particulars, apply to the MANAGER, at the Quarries Narberth-road, R.S.O.—[ADVT.]

### TENDERS.

**BRIGHTON.**—For the extension of the Hanover-terrace Schools, for the Brighton School Board. Mr. Thomas Simpson, Surveyor. Quantities supplied.

Deduction if Brick and Stone facings are omitted and Portland Cement substituted.

Kemp	£1,350	0	0	£30	0	0
Bruton	1,090	0	0	70	0	0
Hindess	1,080	10	0	35	0	0
Lockyer	1,045	0	0	45	0	0
Nash and Co.	1,038	0	0	26	0	0
Barnes	1,027	0	0	40	0	0
Cheesman and Co.	990	0	0	30	0	0
Botting	910	0	0	50	0	0
Spreadborough and Fieldwick	899	0	0	60	0	0
J. and A. Stanning	870	0	0	40	0	0

\* Accepted.

**HACKNEY.**—For the erection of new schools in Gainsborough-road, Hackney, for the London School Board. Mr. E. R. Robson, architect.

Hook and Oldrey	£6,999	0	0
Manley and Rogers	6,970	0	0
Downs and Co.	6,850	0	0
Thompson	6,834	0	0
J. and S. Williams	6,820	0	0
Boyes	6,626	0	0
Pritchard	6,045	0	0
Scrivenor and White	6,008	0	0
Sheffield	5,975	0	0
Ennor (accepted)	5,930	0	0

Accommodation 730. Cost per head £8.2s. 6d.

**HIGHGATE.**—For the erection of Monastery, "St. Joseph's Retreat," for the Very Rev. Anselm Lomax, Rector. Mr. Francis W. Tasker, architect. Quantities supplied by Messrs. Batterbury and Huxley. First contract.

Linzell and Son	£6,980	0	0
Newman and Mann	6,687	0	0
Corder	6,631	0	0
Kilby	6,543	0	0
Patman and Potheringham	6,436	0	0
Bangs and Co.	6,315	0	0
Manley and Rogers (accepted)	6,087	0	0

**LICHFIELD.**—For the erection of a new brewery and chimney shaft, &c., for the City Brewery Co. Mr. George Scamell, 18, Great George-street, Westminster, architect. Quantities by Messrs. Curtis and Son.

	Building	Ironwork.
Sackree	£5,750	0
Low	5,505	0
Brown	5,050	0
Clark	4,795	0
Dakin	4,751	0
Thorneloe (accepted)	4,730	0
Williamson		969
Gimson		1,016
Smith and Wood		1,013
Head		1,006
Burton and Thornley		938
Carter		973
Croskey (accepted)		927
		920

**LONDON.**—For forming and executing walks and other garden works on the Victoria Embankment, west of Hungerford-bridge, for the Metropolitan Board of Works. Sir Joseph Bazalgette, Engineer.

Messon (accepted)	£1,550	0	0
LONDON.			
For iron fencing on the Victoria Embankment by Whitehall-place, for the Metropolitan Board of Works. Sir Joseph Bazalgette, engineer.			

Cottam and Co. (accepted) £1,444 0 0

**PECKHAM.**—For the erection of the Summer-road, Peckham, School, for the London School Board. Mr. E. R. Robson, architect.

Ennor	£9,038	0	0
Newman and Mann	8,989	0	0
Cooper	8,670	0	0
Pritchard	8,591	0	0
Wood	8,218	0	0
Perry and Co.	8,100	0	0
Brass (accepted)	8,097	0	0

**POPULAR.**—For the enlargement of the Brunswick-road, Poplar, School, for the London School Board. Mr. E. R. Robson, architect.

Hearle	£3,350	0	0
Sargeant	3,186	0	0
Thompson	3,140	0	0
Downs and Co.	3,035	0	0
Newman and Mann	2,998	0	0
Sheffield	2,987	0	0
Nightingale	2,976	0	0
Sewell and Son	2,953	0	0
Ennor	2,885	0	0
Kilby (accepted)	2,840	0	0

Accommodation of new school, 200. Cost of new building per head, £14. 4s., inclusive of alterations to existing school.

**STAMFORD HILL.**—For the erection of stables at Stamford Hill, for Mr. H. Hobson. Mr. Theodore K. Green, architect.

Coldwell	£848	6	0
Hicks	805	0	0
Smith	797	0	0
Woodward	757	0	0
Simpson and Baker (accepted)	669	0	0

### BATH AND OTHER BUILDING STONES OF BEST QUALITY

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[ADVT.] OORSHAM, WILTS.

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For List of Prices and Cost of Transit by Sea or Rail, apply to the PORTLAND STONE COMPANY (LIMITED),  
ISLE OF PORTLAND, DORSET.  
London Depôts at South Western and Great Western Railways.

### COMPETITIONS OPEN.

**ROCHESTER, Dec. 5.**—For designs for houses proposed to be built on the City Garden Estate. Premiums of £30 for the best, £20 for the second, and £10 for the third best designs. R. Prall, Town Clerk, Town Clerk's Offices Rochester.

**Geometrical and Encaustic Tile Pavements**  
in every variety. Over Sixty New Designs at 5s. 6d. per yard super. "The Tiles are excellent, both in quality and colour."—*BUILDING NEWS*. "They are of great excellence in design—the material is not surpassed by any found in this kingdom."—*Art Journal*. "The patterns are remarkably good and effective."—*Gardener's Magazine*. &c. &c. Designs and sample Tiles free on application to HENRY C. WEBB, Tiles, Worcester. London House, 114, Victoria-street, Westminster. Mr. T. Pulling, Agent.—[ADVT.]

### CONTRACTS OPEN FOR BUILDING ESTIMATES.

**BATH, Oct. 5.**—For the supply of glazed stoneware sewage pipes. Mr. A. Mitchell, Engineer, Municipal Offices, Market-place, Bath.

**BRIDLINGTON QUAY, Oct. 5.**—For the erection of St. Ann's Convalescent Home and Church. Mr. G. T. Newstead, architect, Coney-street, York.

**CITY, Oct. 9.**—For paving the carriageways of Coleman-street and Walbrook with wood. J. Daw, Clerk, Sewers Office, Guildhall, E.C.

**DERBY, Oct. 6.**—For the erection of new workhouse buildings in the Uttor-terrace-road. Messrs. Giles and Brookhouse, architects, St. James's-street, Derby.

**DUNDEE, Oct. 10.**—For the erection in concrete of 132 houses at Clepington, for the Dundee Working Men's Building Co., Limited. Messrs. Climax and Sey, architects, 13, Frederick-street, Edinburgh.

**EVESHAM NEW CEMETERY, Oct. 5.**—For the erection of chapels, lodge, boundary walls, &c. Mr. G. L. Eades, Clerk to the Burial Board, The Abbey, Evesham.

**EXETER, Oct. 10.**—For supplying and fixing bells in Bridford Church tower. Rev. E. Fenwick, Bridford Rectory, Exeter.

**GREAT WESTERN RAILWAY, Oct. 5.**—For driving about 750 yards of 6ft. heading at Portskewet, Engineer's Office, Paddington Station.

**GREAT WESTERN RAILWAY, Oct. 6.**—For the construction of the Bewdley and Kidderminster Branch Railway. Mr. E. Wilson, engineer, 9, Dean's-yard, Westminster S.W.

**HIGH WYCOMBE, Oct. 9.**—For the erection of a new cottage hospital, with outbuildings, &c., in the Cemetery-road. Mr. A. Vernon, architect, High Wycombe.

**LANCASHIRE AND YORKSHIRE RAILWAY, Oct. 5.**—For the purchase of 400 or 500 tons of wrought iron scrap. W. S. Lawn, secretary, Hunts Bank, Manchester.

**LANCASHIRE AND YORKSHIRE RAILWAY, Oct. 6.**—For the erection of new workshops at Newton Heath. Mr. W. S. Lawn, Secretary, Manchester.

**LONDON GENERAL OMNIBUS CO., Oct. 8.**—For the erection of stabling, loose boxes, smithy, workshops, &c., at Hammersmith. Superintendent of Works, Depot, Bell-lane, Spitalfields.

**MIDLAND RAILWAY, HUNSFLET, Oct. 6.**—For the erection of stabling for 25 horses, with straw-shed, and loose boxes. Mr. Austin, Clerk of Works, Wellington Station, Leeds.

**MIDLAND RAILWAY, LIVERPOOL, Oct. 6.**—For the erection of grain and straw sheds, and shoeing smithy at Sandon Dock. Engineer's Office, Derby.

**MIDLAND RAILWAY, CALVERLEY, Oct. 6.**—For the erection of a house for the station master. Mr. Austin, Clerk of Works, Wellington Station, Leeds.

**MIDLAND RAILWAY, Oct. 6.**—For the erection of station buildings at Humberston-road, Leicester. Engineer's Office, Leicester.

**MIDLAND RAILWAY, Oct. 6.**—For the erection of a warehouse, in Whitcross street, E.C. Engineer's Office, St. Pancras Goods' Station.

**ROCHESTER, CHATHAM, & STROOD GASLIGHT CO., Oct. 7.**—For the supply of about 150 load of Dantzic or Memel fir timber. W. Syms, Secretary, 56, High-street, Rochester.

**ROCHESTER, CHATHAM, & STROOD GASLIGHT CO., Oct. 7.**—For the supply of about 14 tons of wrought iron straps, ties, screwed bolts, &c. W. Syms, Secretary, 56, High-street, Rochester.

**ST. GILES, W.C., Oct. 8.**—For the construction of about 1,543ft. of brick sewer. Mr. W. J. Trehearne, C.E., Surveyor, 199, High Holborn, W.C.

**ST. LUKE'S, MIDDLESEX, Oct. 5.**—For constructing about 50ft. run of brick sewer in Bunhill-row, and about 440ft. in Windmill-street. W. W. Hayne, Vestry Offices, City-road, E.C.

**TONG-STREET LOCAL BOARD, Oct. 9.**—For constructing about 4,500 yards of brick and earthenware pipe sewers, with gulleys, gully drains, ventilators, &c. Mr. J. Lumley, C.E., Kirkgate Bradford.

**WAR DEPARTMENT CONTRACTS, Oct. 8.**—For the erection of a Control Officer's quarters at Milton Barracks, Gravesend, Royal Engineer Office, Gravesend.

### BANKRUPTS.

(To Surrender in the Country.)

William Davis, Crewkerne, builder, Oct. 15, at Yeovil—Charles Morey, jun, Southsea, builder, Oct. 20, at Portsmouth.

### SITTINGS FOR PUBLIC EXAMINATION.

J. Thompson, late of Russell Town, now of Bristol, builder and mason, Oct. 9.—W. Daniell, Yate, Gloucestershire, brick and tile dealer, Oct. 9.

### DIVIDEND MEETINGS.

S. Wyatt, Pontnewynydd, Mon., late painter and glazier, Oct. 14.—J. Croudice, Sunderland, timber merchant, Oct. 10.

### SCOTCH SEQUESTRATION.

William Clugston, Glasgow, contractor, Oct. 1, at 12.—James Low, Cambuslang, joiner, Oct. 6, at 2.

### PARTNERSHIPS DISSOLVED.

J. and T. Ledbury, Trowbridge, carpenters and builders. —Elizabeth Kealey and Sons, Lincoln, decorators, carvers and gliders. —Goose, Rogers, and Goose, Smethwick, engineers. —Dunn and Walker, Great Driffield, timber merchants. —Slee and Morgan, Carlisle, painters and glaziers. —S. J. and T. H. Bradbury, Radcliffe, iron and brass founders. —Credland and Sydenham, Sheffield, timber merchants and marble masons. —C. W. and J. H. Vaughan, Hereford, plumbers. —Watson, Peters, and Todd, Liverpool and Wigan, timber merchants. —Stell and Greenwood, Burnley, painters and decorators.

### LATEST PRICES OF MATERIALS USED IN CONSTRUCTION.

(From the Public Ledger.)

Pig	Foreign	LEAD.	per ton	£20	10	0	£21	0	0
"	English W.B.	"	"	22	15	0	23	0	0
"	Lead Co.	"	"	22	10	0	22	15	0
"	Other brands	"	"	21	15	0	22	0	0
Sheet	"	"	"	23	0	0	0	0	0
Shot, Patent	"	"	"	26	0	0	0	0	0
Red or minium	"	"	"	24	10	0	0	0	0
White Dry	"	"	"	28	10	0	29	0	0
ground in oil	"	"	"	0	0	0	0	0	0

### IRON.

Pig in Scotland, cash	per ton	£4	8	6	£0	0	0
Welsh Bar, in London.	"	9	0	0	10	0	0
"	Wales	8	10	0	9	0	0
Staffordshire	"	10	0	0	11	0	0
Rail, in Wales	"	7	10	0	8	0	0
Sheets, single in London	"	13	10	0	14	10	0
Hoops, first quality	"	11	10	0	12	10	0
Nail Rod	"	10	10	0	11	10	0
Swedish	"	17	0	0	19	0	0

### COPPER.

British—Cake & Ingot	per ton	£88	0	0	£90	0	0
Best selected	"	90	0	0	92	0	0
Sheet	"	92	0	0	96	0	0
Bottoms	"	97	0	0	98	0	0
Australian cake	"	88	0	0	90	0	0
Spanish cake	"	0	0	0	0	0	0
Chili Bars, cash	"	80	0	0	82	10	0
"	Refined ingot	0	0	0	0	0	0
Yellow metal	per lb.	0	0	7½	0	0	8½

### OILS & C.

Seal, pale	per tun.	£35	10	0	£0	0	0
Sperm headmatter	"	104	0	0	105	0	0
Cod	"	39	0	0	0	0	0
Whale, South Sea, pale	"	30	0	0	0	0	0
Olive Gallipoli	"	47	0	0	0	0	0
Cocoanut, Cochinchina	"	43	0	0	44	0	0
Palm, fine	"	35	10	0	0	0	0
Linseed	"	27	0	0	27	5	0
Rapeseed, English pale	"	31	0	0	31	5	0
Cottonseed	"	27	5	0	27	15	0

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## THE BUILDING NEWS.

LONDON, FRIDAY, OCTOBER 9, 1874.

## GUNPOWDER PERILS.

COMPARISONS have been drawn between the aspect of St. John's Wood and its vicinity, after the explosion of Friday morning, and the results of a bombardment. The writer has seen not a few towns on the Continent which had been shelled for weeks, besides having the heaviest projectiles directed against their fortifications, but nowhere did a scene appear parallel to that created by this great gunpowder shock. The daily newspapers have familiarised the picture—of dilapidated dwellings, of broken windows, of ruin and danger; and there has been, and will be, the inevitable discussion as to measures for insuring safety. Some of those recommended have been pooh-poohed as superfluous; but he was a practical thinker who said that precautions never seemed so unnecessary as when they were successful. The whole subject claims attention now, and especially in relation to our loose methods contrasted with those which are insisted upon in many parts of the Continent. Holland is a country of canals, and vast charges of fulminating substances were lately employed in completing the Haarlem improvements; but an accident to a Dutch gunpowder barge is an event unheard of. It is painted of a peculiar colour, it is labelled, it is doubly and triply tarpaulined over, it has a copper lid, fitting like the top of a housemaid's pail; even its fires are perfectly safe, and the men not only may, but do, smoke upon their tediously-crawling voyage. So in Germany, upon water no less than upon land, a vessel thus laden is absolutely fortified, built in cells, made more air than water-tight, and so constructed, in fact, that scarcely any mischief, short of that wrought by an incendiary, can fire the magazine. Moreover, no other cargo is allowed to be carried, and its nature has to be declared before the necessary papers are granted. In the Eastern provinces of Russia, where blasting is almost an Imperial process, a curious plan is adopted. The powder is arranged in tiers at the bottom of a deep-hulled boat, a well-caulked deck is laid over it, and this is flooded, so that by no possibility can a spark, whether from funnel, or match, or friction, reach the deadly deposit below. But it is at once to be admitted that the manufacture, storage, and carriage of gunpowder must be at all times, and under any circumstances, a dangerous occupation. Bring together three ingredients—charcoal, sulphur, and saltpetre—and you are in presence of a tremendous peril. The workman may wear shoes without nails, cover the floor with undressed hide, use no iron tools, and dream himself into an idea of security, yet a fatality is always possible, guard against it as he may. And even without bringing them together, one of the three at least is formidable in itself. Ground charcoal, allowed to lie in bulk and exposed to the air, is nearly certain to ignite. The storing of charcoal is, indeed, prohibited within 20 yards of a powder-house. Then the ripe gunpowder itself is not more terrible than what is technically called the "green charge," such as that which annihilated in an instant the bomb-proof structure at Faversham, in 1867. But, remaining among the experiences of the land, as of more vital importance than those of the water, we may note the deficiencies of our system, in comparison with the other more thoughtful, more careful—more conscientious, it may even be said—systems of Europe. The Faversham, Hounslow, Waltham Abbey, Kame's Works, Battle, Melford, Ewell, Roslin, Lowwood,

Tunbridge, Ballincollig, and Erith explosions, all occurring within a few years, brought vividly to recollection by the last calamity, justify, perhaps, a few general remarks upon the subject. The Act of Parliament is by no means explicit. Without entering upon minor details, it may be interesting to make some observations upon the regulations enforced with respect to the works, or edifices themselves, as they are permitted by law. They must be of stone or brick. The important sections must be at least 40 yards distant from each other. A storehouse must be 140 yards distant from a mill; and large powers of official inspection are allowed. In 1864 a frightful disaster happened at Erith, when the entire question came up to the surface, through a memorial setting forth that the inhabitants of an entire neighbourhood were in constant jeopardy, and praying that the structural arrangements of these fearful, yet indispensable, manufactories, should be remodelled. But it seemed, from after investigations, these were not in fault; the buildings at Erith, for instance, lined an embankment of solid earth, bordering the river; all the shutters were of non-heat-conducting wood, with copper fastenings; the riverain wall constituted a protection in itself, and those who have visited these and other works can testify to the truth that they have been prepared as though to resist the attack of a powerful enemy. There is nothing, as a rule, in their construction, to warrant alarm, although there may be in their locality; and there is nothing, generally speaking, defective in their regulations. It is, indeed, in the neglect of these regulations that the evil lies. Proof was given, after the woeful tragedy of October, 1864, of doors open that should have been shut; of exposed stages and tramways; of notice boards disregarded; of smoking, match-lighting, inflammable grit strewn the pathways, steamers passing close, with flaming funnels, candle and bone factories close in the neighbourhood, locomotives passing up and down, scattering fireworks as they went, and so forth; and a suburb growing round the spot—the very thing against which the original builders endeavoured to be forearmed. For, wrote Colonel Moody, in his Official Report, "It will not be out of place for me to state that, formerly, when the magazines were constructed, the neighbourhood was very isolated, and, probably, the footpath rarely used; now, however, the case is different, and every day will make it still more different." In regard to actual construction, it was objected to the magazines at Lowwood that they were perilously light in comparison with those sanctioned on the part of Government, and that they contained unprotected apertures. At Coventry there was a condemned intricacy of iron bridges—condemned, however, too late, and no proper boundary-wall; and, hard by, the Canal Company had a water-pound sixteen miles in length, without a single lock to prevent the entire distance from emptying, should the banks have been blown away. Not far was the Ashby-de-la-Zouch Canal—a length of thirty miles without a lock—liable to an immediate escape of its waters through any rupture of its frail protections, to the utter destruction of coal-mines, cattle, growing produce, and every other kind of property. Little wonder, then, that the public are looking far and wide at the sites of our great gunpowder stores, and asking for additional guarantees for safety and against alarm. The proprietors at Foleshill, near Coventry, wrote a few years ago to the Home Secretary, replying to a cry of terror from an inhabitant, "The house referred to is protected by an embankment, which was erected at our cost, at the request of the proprietor, which, in the event of an explosion, would, we believe, be a sufficient protection." Did it prove so? They add, standing upon their license, "The magazine is situated in the centre of a mining district,

and was placed there to meet the constant, we may almost say hourly, demand for gunpowder for the use of the mines. The public road, twenty yards off, was in use." Within a thousand yards radius there were, as a matter of fact, more than five thousand people living. Now, as to the distribution of these secret dangers, not less terrifying to the public than are mines to a besieged garrison—there are few in the agricultural counties; but the great stone, coal, and iron shires, as well as the manufacturing towns, abound in them:—Cornwall, Cumberland, Gloucestershire, Northumberland, and Yorkshire. It was suggested by a coroner's jury at Erith that the chalk cliffs in the vicinity might be utilised by hollowing out a series of cavernous magazines, in which accident, or contact between one and another should be next to impossible. This might be done at Purfleet, and many other points of the coast, and even inland, at a moderate cost, and with the utmost facility. All such excavations would, necessarily, be above high-water mark, and no artificial walls would be rendered liable to destruction through the explosion of a gunpowder store thus taken in charge. As it is, not a powder factory or a powder magazine exists in the United Kingdom which is not the radiating point of unknown and unimaginable perils, a reflection which, were not habit so powerful, might induce a little activity of public opinion upon the subject. There is something peculiarly awful and appalling in a great explosion. It is one of those incidents revealing to us the terrific powers lying dormant at our very feet. It is by a merciful constitution indeed that we are enabled, for the most part, to live unconscious of them. Someone has said that if a man's skin were transparent, so that he could see the marvellously delicate organisation of his frame, and could watch its intricate and complex working, no man would venture to move. He would think it impossible to stir without injuring such a slight and subtle organism. So, with a gunpowder ebullition upon a vast scale—it supercedes, for a time, all other sensations, and concentrates upon itself, as by an irresistible fascination, the common interest. The greatest catastrophe within living recollection was probably that at Gateshead, just twenty years ago, which reduced that town, with Newcastle also, to a condition worse than that in which either Metz or Strasbourg was left by the Prussians after the late war. It shook the city, and shattered nearly every window. The effect was felt fifty miles away. Had four thousand Krupp guns been simultaneously discharged upon one spot, the earthquake—for earthquake it literally was—could not have created a more far-spread panic. Here, as in the case of the canal, there was an embankment to intercept the instantaneous hurricane; but it only aggravated the ruin, and might have brought the Tyne over acres of its original bed, long ago, by enormous labour, reclaimed. The reason why these misfortunes happen so frequently near river shores and embankments is obvious; gunpowder is more conveniently carried by barges than by any other form of vehicle, and hence it is that nearly all legislation on the subject, having to deal with two difficulties at once, has been ineffectual. People standing apart from the scene are, of course, prolific with suggestions; they hint even that the ingredients of gunpowder might be kept separate until wanted for use, and then mixed, "like Seidlitz powders;" but nothing practical has hitherto been proposed for magazines on land, beyond their separation one from another by gigantic mounds or dykes of earth, so that the explosion of one "house" need not affect the next, provided that all had casemated roofs. As a rule it is better to isolate these storehouses of destruction; to locate them in the midst of marshes and wastes, remote from rivers, from highways, from populous places. For when



the catastrophe does occur it overwhelms all. Man and matter perish together, shivered into innumerable fragments and whirled off into space. There is a yawning crater or a blank upon the water left where there had been a building or a cargo. *Etiā periere ruine*: the very ruins have vanished, excepting those which indicate the lesser havoc that was wrought last Friday morning around the area of the Regent's Park. But as to direct and distinct causes all witnesses are silent. We might as well ask for explanations concerning the Siberian mammoth as attempt to bring conjecture to a close by indicating the proximate cause of the Regent's Canal explosion, and, besides the plainer and more obvious precautions to which reference has been made, it is difficult to see what more is to be gained in the way of security for the future. Gunpowder will never cease to be in demand until it is superseded by some composition of even more terrible power. So long as it is in demand, it must be manufactured somewhere, used somewhere, and carried from place to place in one way or another; nor, as we have said, is it likely that the manipulation of a compound expressly designed for purposes of dislocation and destruction will ever be free from danger. Still, the public is naturally anxious that no possible improvements in the construction and arrangement of powder-mills and warehouses shall be neglected, for it is a fearful trade, and those who carry it on lie under exceptional responsibilities. There is one point always to be kept in view:—If the business must needs be carried on within range of thickly-inhabited districts, it should be carried on, as it were, under a kind of hermetic seal, with a discipline more vigorous than that of the Dutch Diamond factories; if it may be established in comparative loneliness, still the lives of the workpeople are momentarily at stake, and it is thoroughly well-ascertained that they are not capable of taking precautions for themselves, or the world would not have heard of that firework explosion caused by a woman engaged in filling rocket-tubes and in frying sausages at the same time. The utility of gunpowder, for other ends than those of war, is continually increasing; a deficient supply would be a calamity to the nation, but the necessity of having it safely housed is becoming more imperious every day. A powder magazine or warehouse should be, so far as is possible, above suspicion.

#### ARCHITECTS & ENGINEERS.—THEIR AGREEMENTS & DIFFERENCES.

IF two representative members of the respective professions of architecture and engineering were employed to design a bridge, it is most probable they would set about the work in two very different ways. Assuming that each had to lay down his own conditions, it is more than probable a very opposite mental process would be called into requisition by the two competitors. This opposite view of each would partly arise from education and partly also from mental difference between the two candidates. The difference would not arise so much from the different discernment of the requisites of such structures, as in the methods employed to solve the problem. The models taken by the architect would, no doubt, be different to those the engineer would place before him. With the architect the grand old Appian Way, the bridges of Trajan, the aqueducts of Nîmes, Tarragona and Segovia; the picturesque arches which span the Tiber, as St. Angelo, or the still more picturesque remains of Mediæval bridges, would flit across the imagination. The engineer would take as his models the more modern, though no less famous examples of inventive skill, the great tubes of the Britannia and Conway, the iron ribs which cross the deep valley of the Tyne, or those more recent examples which span the Thames at Westminster and Blackfriars.

It is obvious the example of a bridge which we take to illustrate the divergence of the architectural and engineering minds is perhaps of all illustrations one which may be considered a rather trying one. For this very reason, however, it affords the best test of the respective modes of design. The very conditions of a good bridge are precisely those which seem to frustrate all artistic considerations. To cross a tidal river two important requirements must be met. The tidal current must not be impeded unnecessarily, the traffic of the river must, if possible, be unobstructed by piers; and the bridge itself must be of such a slight gradient as will both afford easy vehicular traffic and not unreasonably add to the weight of superstructure. To meet these wants the straight beam principle of construction is evidently more suited than that of the arch; and the mind at once recurs to the tubular type of the Britannia Bridge, or the lattice girders, as exemplified in those structures which carry our railways over the Thames at Charing-cross or Blackfriars. This at once makes the case for the architect particularly trying; he must acknowledge, at least, the superiority of the straight form, and he is forced to admit also that brick and stone must yield the palm to iron. But if architecture is a living art, why should such an obstacle impede the capabilities of the art, or why should its devotees feel any uneasiness in dealing with so trivial a difficulty as the substitution of one kind of material for another? The question is too ominous to answer. We feel we have, by putting it, anticipated a rather ugly fact. Once assert that Architecture only deals with brick, stone, and marble; that she cannot exercise her supremacy over the material of a newer civilisation; that with the great monolithic and stone periods of Egyptian, Grecian, Roman, and Mediæval civilisations, her magic spell came to an end,—and we acknowledge the supremacy of the art to have been like the transient power of the magician's wand, or like the short-lived priesthoods and oligarchies under which she prospered. But we believe her destiny has a wider scope than this. If she is at present powerless, we must trace the cause to some more subtle agency. It is, indeed, a fair assumption that those who follow her have at least lost the secret of her success and power. At any rate, we must charitably assume such to be the case. We have been told by a most popular author of recent times that a critical age is adverse to fine-art creation; that the images of poetry cannot be conjured up by analytical processes; and that it would be as impossible for an author by a critical analysis to produce an Othello or a Macbeth, as it would be for an anatomist to form a living man out of the fragments of his dissecting-room. Critical analysis can rarely combine or construct; hence critics seldom make poets or artists. Those, we are told, "feel it most, and write poetry best, who forget that it is a work of art." The constructive faculty of the artist, in like manner, cannot always give us reasons; it can combine and form a pleasing whole without being able to analytically examine the parts. The architect who designs a bridge does so, more or less, intuitively: he disposes a pier here and there, and spans them by an arch of a curve which pleases by its proportions; and he may just possibly hit upon the proportions which the engineer has arrived at by a laborious tentative process, or a process of reasoning upon the ultimate load and the arch of equilibrium which is suited to it. The divergence, at least, may be so slight that the labour expended in ascertaining the "line of pressure" of the equilibrated arch in disposing the necessary resistances, form of abutments, and surcharge may appear a waste of labour. We do not mean to say an architect would be so rash as not to determine, approximately at least, the line of equilibration or pressure, and dispose his material, accordingly but the difference between

the architect's and the engineer's methods of arriving at the result would in all probability be different. The architect would make his ideal form approximate to the theoretical curve; the engineer would form his design upon it. In one case there is a pre-existent idea formed to which all facts must conform; in the other case there is an attempt to combine the facts and to create a whole out of them. The engineer knows the capabilities of iron; he knows that a certain form and disposition of metal gives the greatest rigidity with the least amount of weight; he understands how to apply, by either a rule of thumb or a mathematical process, the same proportions to a certain span or under a certain load; he sees what has been done in the same way before; or he knows by experimental acquaintance what quantity of iron and what form should be given for a certain load to insure the desired results. He combines these experimental results with more or less success, as he can separate the chaff from the grain, or seize hold of the principle involved in the facts he is acquainted with. If he further possesses the artistic faculty, he can achieve a creditable work in the most scientific way.

How does the architect proceed? Up to a certain point he may follow the same process, that is to say, he knows there are two ways open to him—that of accepting the materials of the engineer, and working them out as he does; or else standing fast to the traditions of his art. His artistic inclinations lead him to the latter alternative. Instead of analysing results of experiments, he at once sets up an ideal type—a theory. His educational associations lead him to this mode as much as those of the engineer lead him to his mode. The first draws his inspirations from antiquity, the latter from modern use. An ideal drawn from antiquity means a type, while with the latter it is a mechanical solution. The engineer glories in his vocation being one of to-day. Not long since Mr. F. J. Bramwell, the well-known engineer, in his opening address before the Institution of Mechanical Engineers, exulted in being able to confine his remarks to the limited range of a century, and said he would not be tempted by even the name of Archimedes to advert to ancient engineering, so little has been gleaned by the ancients. Such an assertion would shock many in the sister profession—though it shows the difference of thought, in a remarkable degree, of these two professions. Take a representative member of each profession—a Scott or a Street—and compare him with a Fairbairn or a Hawkesley. Though up to a certain point of their respective vocations there are necessarily resemblances, it would be easy to show a remarkable disparity or divergence of thought and feeling, and mainly due to education. The boast of one is spurned by the other. One has to look to the past for the greatest achievements of his art, while the other points with the greatest pride to the present, and anticipates the future. Architecture appears as a growth which has reached its maturity—a vitality which can never look more fresh and vigorous than it did under the infancy of man, while the art of the engineer is like a germ whose development appears to be co-extensive with time itself, and whose destiny is hidden in the future.

May not, however, the apparent immutability of architecture, and the ceaseless activity of engineering be phases of one another? It has been said truly, that the poetic faculty requires a believing, not an examining, frame of mind; in the same way it may be shown that a critical age is hardly the one most favourable to artistic progress. Hence our engineering is at present our only progressive form of architecture. What we call the latter is mainly imitation, or a species of connoisseurship, although we may here and there find the real art.

Architects and engineers, however, have both something to learn. Before the steam-engine created a demand for engineers as a



separate profession, architecture and architects absorbed all the inventive and scientific skill relating to construction. The divorce between the two made architects imitators, and engineers simply mechanics. Neither art is, therefore, truly representative; the architect gives us the sentiment, the engineer bare facts, crude, shapeless, and unfeeling. We believe both can learn from each other the knack of making their productions palatable. The engineer is too addicted to wrap himself up in his facts and formulæ, as if there was nothing beyond the confines of mechanics and iron. This kind of obtuseness or obliquity as regards fine-art discernment is almost a concomitant of the education of the engineer. It is natural for him to design a girder in the directest way possible to his senses, i.e., to one kind of sense. He looks at a girder in the same way as he looks at everything else, in a contracted kind of manner, as if there was nothing else to consult than the iron itself, its weight, and tangible properties—as if, in fact, his view bounded the whole horizon of knowledge concerning a girder. He designs it in total obliviousness of any sense or feeling but those which appear to him to be the most immediately concerned. Though he knows girders with straight and equal flanges give more strength where it is not required, in ninety-nine out of a hundred cases he chooses the straight form as the more economical in labour if not in iron. The idea that a girder of uniform strength may also be the most pleasing form does not for a moment strike him. It is enough that the straight girder is the most direct mode of manufacture, and the idea that it will inflict a lasting injury to the mental vision of thousands of beholders is never dreamt of. For the nonce—for his sense and day at least—it answers its end for all practical purposes, and that is sufficient—he does not trouble himself about what form engineering science may make of it in a century's time; and he little dreams that every form he creates calls into exercise a thousand senses or perceptions of which he has no idea; that while one of his forms may answer tolerably its intended use, and satisfy one sense, it may also be inflicting irreparable injury on another.

But the fact is, the engineer of the present works only by his own light and by the shortest way, and he may be compared to a machine whose movements are necessarily the most direct, though not always the simplest, most efficient, or desirable. We think much of this apparent imperfection of the works of the engineer may be remedied by the establishment of a society for encouraging the combination of artistic and mechanical skill. Our present Institutes of Architects and Civil Engineers are too exclusive and separate; they rarely combine or interchange ideas; one society keeps to itself too much, and is not very disposed to exchange opinions with its sister society. This is to be regretted, and we could wish that the Royal Institute would open its doors wider to the civil and even mechanical engineer than it does. There would be a mutual benefit by so doing, and the social friction and want of harmony that appear to exist at present between the two professions would be considerably mitigated by the advancement of what may be termed—in lieu of a better phrase—fine-art construction. We think the only way of bringing the two professions together, of giving to each somewhat of the mode of thought and feeling of the other, would be to establish an institution of Interchange, whose members shall belong to both professions, and one indeed where both the artistic and scientific elements of the day shall be fully represented.

#### COLOUR.—VII.

##### GRADATION OF COLOUR IN ARCHITECTURE.

WHEN we come to consider the application of colour to large interiors and public buildings, we approach a subject of

some difficulty, requiring a more than ordinary degree of discernment, and this is rendered more difficult when the building possesses architectural claims. It will not do to say any colours that contrast well, or that can be harmoniously blended, may be employed; nor will it do to leave the matter in the hands of the mere decorator to use his discretion in colouring the wall surfaces, picking out with colour the cornices, and stencilling floriated and other patterns upon the ceilings and walls. Such an indefatigable dabster will not take long in concealing with paint every square yard of surface. He may even present a pleasing combination of colour, but it may fail in one respect—a point that kills every redeeming virtue, that darkens an already dark hall or apartment, or that renders the colours themselves perfectly nugatory when the painted glass windows are put in. He may have spent months over the decorations, and spent a great many more hundreds of pounds in that time, and yet his work may be entirely thrown away for anything that he has done to assist the architecture, or to decorate the hall. Let us illustrate our meaning more precisely. A decorative artist, engaged at a fabulous price, may execute a series of cartoons or panelled pictures that may be admirable in themselves, and even rival the frescoes of Raphael; stained windows are afterwards introduced in which a certain colour predominates, and the effect of these pictures is completely sacrificed, their colours are neutralised, and the artist's labours have been thrown away, upon a wall which would have been better of a sombre tone or neutral tint; or, supposing the stained glass had been first introduced, the most brilliant colours placed upon the wall surfaces would probably be so lowered in scale and brightness that they would become mere daubs, such as an ordinary third-rate painter could have accomplished with equal effect.

Again, how frequently is a bright colour introduced where its brilliancy is lost, as in a shadowed recess, in a deeply-moulded cornice, or in some position where the direct rays of sunlight always cast a shadow upon it. More frequently we see an apartment or a gallery decorated with such glaring colours that all the objects or works of art it contains are thrown into a cold, lifeless shade. The effects of contrast of tone have been unheeded. Take a picture-gallery, and imagine a bright, vivid colour between the pictures; it would kill them utterly, and yet a profuse display of gilt frames is always seen in our picture galleries. The pictures themselves are thus reduced in the amount of effect the artists intended to produce. Much as it might seem to detract from the display in such galleries, we think those who invite the exhibition of pictures should reject all frames of gilt. Every artist and connoisseur knows that to see a picture as it should be seen to realise the effect of its perspective and colouring, it should be seen through an aperture which excludes the sight of the frame and limits of the picture. Seen thus, a good painting presents a hundredfold more of the realistic power it possesses, and may be compared with the more illusive effect of a theatrical stage scene whose limits are surrounded by the dark draperies or shadowed accessories of the proscenium. The overcrowding of pictures also should be avoided, so as to allow a margin of wall colour, which should never be any bright colour, but a neutral or retiring grey, to surround each picture. In a private picture-gallery the wall colour should be of a complementary hue to the predominant colour of the pictures placed against it; in a varied collection a neutral or normal grey is to be preferred.

In halls and galleries intended for the reception of statuary or white marble sculpture, the contrast most desirable is, we think, that which enhances the warmth of the marble. A wall colour of bluish-grey, or green of a bluish tint, will give to the sculpture a warm or a rosy tint; and we think the latter tint

is more agreeable. For sculpture-galleries, the tone should be pretty dark, to throw out in relief the white sculpture. For bronzes, the dominant hue they have should determine that of the walls; if they are green, a reddish tint will be the best wall colour; if they have the metallic or golden tinge, the colour best suited will be a blueish one. In galleries or museums, where the contents are of varied hues, a normal grey is the only desirable tint, and this should be of light tone.

The above remarks apply to interiors supposed to be sufficiently lighted, and whose walls or not disposed to reflect the light; but it is obvious that the colourist must use a discretion dictated by each special set of conditions, and therefore it is useless to lay down a hard and fast rule. Let us consider some of these conditions. The decoration of interiors must obviously be determined by two fundamental considerations; first, the *intensity* of the light admitted; and, secondly, the *kind* or quality of the light admitted. The intensity of light depends chiefly on the position and area of the window apertures. Top-lighting, as through skylights, is generally the most intense; while side-lights as windows admit, in towns at least, only an indirect and often-reflected light. Another point must be noted in the decoration of interiors lighted in either of these two ways. Sky-lighting more or less throws or obscures in shadow the ceiling and upper portions of the walls; the ceiling receives only reflected light from the floor and wall surfaces. On the other hand, side-windows diffuse the light more equally, and the ceilings and walls are pretty equally illumined. It is very necessary to bear this distinction in mind, so that the application of colour may not be wastefully expended in prodigal displays of colour and mosaics on shadowed surfaces which cannot be rendered too light, while the lighter surfaces are barely covered. As a rule, surfaces thrown into shadow, as the ceilings and vaults of churches, should either be left alone, or be relieved by such a balance of complementary colours or tints of light tone as will produce white light; while the highly-illumined parts should be subdued by stronger tones. A neglect of such a distribution must invariably mar and detract from the finest interior. We confess it was this want of discernment between the shaded and illumined parts of St. Paul's, the putting the darker and heavier masses of colour upon the distant and unillumined surfaces, that disappointed our expectations when examining the late model at Burlington House. Another error we will allude to by-and-by, when we speak of the quality of light admitted.

The great object to be aimed at by the polychromist is not simply decoration. He should preserve and create light, and so distribute it that an equable glow of coloured rays may be the result, imparting to the broader surfaces tones of subdued colour, and to the architectural details richer hues of accentuating force. Generally, the principle of giving greater depth of tone to the illumined surfaces of an interior should be observed, and we would say decorate only those parts as a rule. Again, the observance of an aerial perspective or gradation of colour is essential to harmonious distribution *ceteris paribus*.

Let us imagine a large interior. The light streams in through side-windows, throwing strong cast shadows here and there close to the light, broader and less distinct as the objects are removed from that source. The vista of wall surface or pillared arcade stretches and becomes softer and softer as it recedes from the eye, the accentuated lines of defined shadow grow paler, till in the extreme distance a haze of tone, a kind of mezzotint or half-shade prevails. The bright pencils of light, the glimmer of light and shadow, merge in one hazy hue, lost in the perspective. What is the lesson to the artist? It is simple. On the broad surfaces of wall and pillar let the colours be secondary, in the luminous parts of



dark tone, in the shadowed parts of lighter tone; let the primary colours, blended in proper proportions, be distributed over the luminous points of detail, gradated in a decreasing ratio of tone from the strongly illuminated and chequered floor to the vault above. The same upward gradation of tone should be followed in the broader tints, constantly bearing in mind that the intensity of light diminishes upwards.

We have yet another point—that of quality of light admitted, which we will now only briefly touch, as it is a larger question than can be dealt with in one article. By quantity of light we mean the medium through which it is admitted, whether that be white or coloured glass. Our previous observations must be regarded as applicable only to plain colourless glass, as we have been dealing with white light. When we come to coloured glass all that we have suggested would require a modification—the tints and tones would need to be modified in accordance with the dominant colour of the transmitted light. It wants no force of reason to convince any one that the transmitted colour rays materially affect the coloured decorations both in tone and hue. For instance, a red ray falling on a red colour would raise its tone; while falling on blue colour it would make the latter appear as a purple. In fact, any positive-colour ray will produce a secondary falling upon a another positive, while a secondary-colour ray will produce a tertiary, and so on. Thus the dominant colour of the glass positively destroys the interior colouring, or so far neutralises it as to tinge all the colours employed with the prevailing hue. Wherefore then, we ask, is the use of employing coloured decorations in such a building? The brightest tints are rendered secondary or muddy, the dark tones are clouded, and the secondaries become neutral daubs. But we will resume the subject in our concluding article.

#### WHITE BRICKS.—V.

##### EXPENSES OF MANAGEMENT AND SUNDRIES.

MUCH more attention ought to be given to the expenses of managing a brickyard than is generally the case, as it is an item which very commonly eats up a large proportion of the profits. If bricks only are made, it ought not to exceed 2s. per 1,000 for white bricks, or 1s. 6d. per 1,000 for red bricks. If moulded bricks and fancy goods are made, a better foreman will be required, and the wages ought not to be less than from 40s. to 50s. per week; and if the works are very extensive, he will require a youth to assist him in writing, at from 12s. to 18s. per week. If any additional bookkeeping is required, it is better to obtain occasional assistance from a duly-qualified accountant. No larger staff than this ought, in the author's opinion, to be engaged upon a brickfield. In small works making less than a million annually, the foreman ought to be a working man—either a first-class moulder or a burner—with a constant salary of from 20s. to 25s. per week, which, with piecework, would be made up to 35s. or 40s. per week, with a youth, as above-mentioned, to assist in the writing. If this point was attended to more carefully, it would soon make a wonderful difference in the success of many works. The great reason why so many brick companies fail is that the expenses of management eat up all the profits. Of course these remarks are only intended to apply to the permanent management when the brickyard is in working order. In laying out the works at first, and arranging and designing the machinery, the services of an engineer will be required, and possibly of an analytical chemist; but these may and should be dispensed with directly the works are set thoroughly going, as, if the foreman is a competent man, he ought to know how to act in the case of a breakdown or any other emergency. In very large works, when there is a large quantity of machinery, it ought to

be thoroughly inspected by a competent engineer every three months. Every large works when there is much machinery ought to have a small fitting-shop, with a lathe and other tools, near the engine-house, also a smith's forge and carpenter's shop. A handy man of the same class as a village wheelwright would find constant employment in mould-making, attending to the repairs of the plant, shoeing the horses, &c. Superior work not of too heavy description may be done by the engine-man, who ought to be a good fitter. The smith and carpenter might act as a spare engine-driver when required. The cost of maintaining plant and machinery varies considerably, according to circumstances, but when it has been properly arranged and constructed, it is considered sufficient if, on works making more than a million annually, 1s. per 1,000 is reserved for the purpose. Insurance against fire and accident ought to be covered by 6d. per 1,000. Royalty varies from 1s. to 2s. per 1,000; it will be safe to take the mean, and reckon it at 1s. 6d. The summary of these general expenses will, therefore, be as follows:—Management, 2s. per 1,000; repairs, 1s. per 1,000; insurance, 6d.; royalty, 1s. 6d.; rates and taxes, 3d. Total, 4s. 3d. per 1,000.

*Carting to Station.*—It is better, if possible, always to sell bricks upon the ground, and let the carting be a separate matter. This can, however, only apply to local trade. A large works can seldom or never be kept going by the district in which it is situated. Such a works ought always to be near a station, or, if possible, to have a private siding, so as to bring the trucks alongside the kilns, and load directly into them. In dealing with first-class white front bricks, there ought to be as little loading and unloading as possible, as if the arrises are chipped, or the corners knocked off, the brick is reduced sometimes to half its value. Great care should be taken in loading the bricks into waggons; and if they have to be carted any distance, they should be packed with heath or some similar substance. In packing in the railway trucks, they should be placed endways and not crossways, as if so arranged, they are not so likely to strike against each other in the starting and stopping the trains.

*Selling Price and Profit.*—The price of first-class white front bricks ranges from 40s. to 45s. per 1,000, according to the district where they are manufactured. In the London market the prices range from 50s. to 60s. per 1,000. The cost of manufacture as above stated is 25s. 4d. per 1,000; average waste per 1,000, 4s. 6d.; general charges, 4s. 3d. per 1,000. Total, 34s. 1d. per 1,000; leaving a profit of estimating best bricks at 12s. 5d.; seconds, 7s. 5d.; thirds, 2s. 5d. per 1,000.

#### MEMORANDA.

*Weather Stains.*—Green stains are sometimes seen on white bricks; these are only found when the brick is underburnt, and arise from a minute fungus in the moulding sand, possibly from the infiltration of water carrying with it small portions of vegetable mould. The stains are more particularly noticed in the Poole bricks and other bricks of the same character, which require a great deal of firing; they are never found in bricks or clays which vitrify easily. These stains are only on the surface, and may almost always be rubbed out when the brick is perfectly dry. If the stain reappears it may be permanently removed by mixing up a wash of the clay and sand of which the brick was made with sulphate of copper, painting over the brick with it and leaving it till it is perfectly dry, and then rubbing it off with a hard brush.

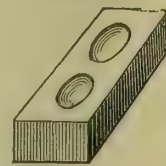
*Natural Face of a Brick.*—The natural, sanded face of a burned brick ought never, if possible, to be removed; any cutting ought to be on the bed of the brick. The author has frequently seen bricks which were cut green to save time, and the sides so cut placed out-

wards perish with the frost, while similar bricks moulded, instead of cut, to the same pattern stood perfectly well. All bricks which require to be cut green, and to have the side so cut exposed to the weather, ought to be washed over with a wash that will vitrify in the burning.

#### SUGGESTED IMPROVEMENTS IN MANUFACTURE OF WHITE FACING BRICKS.

*Form.*—A great improvement in white facing bricks would be to increase their size—not in the length and breadth of the brick, as that would interfere with the bond in working in with bricks of the usual size, but in the depth; so that a brick might be two or three courses deep. Such bricks would require to be made hollow, in order to make them light for railway transit. Such bricks two courses thick might be so made as not to weigh more than one and a half times the weight of a common solid brick. The best form for them would be as in Fig. 16, with two large square hollows rounded at the corners in each brick, not passing completely through for the whole surface, but only pierced completely through with four small holes, which would serve as air-holes. Such bricks would not be heavier than the large bricks, 3in. thick, which are frequently used. They might either be made two at a time in a block-press, or in moulds, with rollers to withdraw, similar to those described previously for making hollow blocks. The cost need not be more than one-half more than common solid face-bricks, and they would double the work.

FIG. 16



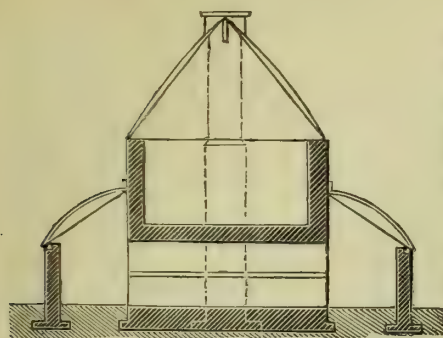
*Colour.*—The great defect in white facing bricks is that the colour is so seldom uniform. This is in a great measure owing to the irregular heat the bricks receive in the kilns, especially in open-topped kilns with horses, where the flame rushes up through the holes between the horses. The smoky flames which pass through the kiln immediately after firing up are of a strongly-oxidising character, and cause flashes of red or brown to appear on the surface. If the bricks are made from clay which will not stand a considerable amount of heat, these stains can never be burnt off, but grow darker as the heat increases in bricks made from very refractory clay set in wide bolts. In down-draught kilns these stains are not so likely to occur, as the smoke is entirely consumed some hours before the kiln is burnt off. White bricks burnt from refractory clay should be almost white if burnt in a perfectly close heat, or of a warm yellow buff. If set more open and the smoke allowed to pass through them, white bricks, burnt from fusible clay, should be either of a pale or deeper yellow, according to the mode of setting and the heat made use of in burning.

*Auxiliary Flues.*—A much greater regularity in burning and a saving of fuel could be effected if the smoke and flame, and the cold air they carry with them, were prevented from passing through the kiln. The author thinks this might be effected to a great extent by the use of additional or auxiliary flues to each fire-hole, in the centre of a three-hole kiln fired from both ends, or at the end opposite the flue-door if fired from one end. These flues would be closed by dampers, connected by chains with the fire-doors, so that they are both opened together, and the dampers can be closed at any time by the fireman pulling a handle in the kiln-pit. This arrangement is shown in Fig. 17. In down-draught or other circular kilns the auxiliary flues would be immediately over the furnaces, and as the one damper dropped to close the opening to the kiln, another damper on the same spindle would rise, and open the passage to the auxiliary flue. This arrangement is shown in Fig. 18, and includes a



plan for consuming the smoke if required. By adopting this plan the flues and smoke

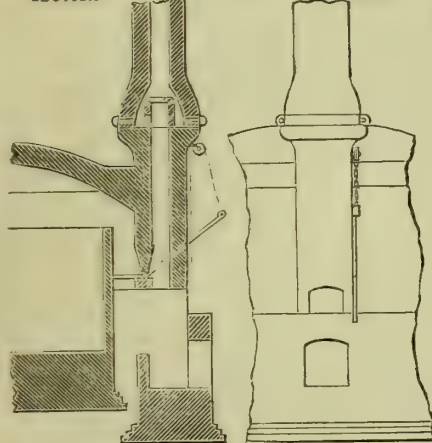
FIG. 17



SECTION

FIG. 18

ELEVATION



pass through the auxiliary flues till they are nearly burned off, and then, by reversing the damper, the heated air and gases can be driven through the kiln, producing almost the same effect as if the goods were burned in seggars.

#### SUMMARY.

The author has endeavoured, in the foregoing remarks, to describe the materials from which white bricks are manufactured. 1st, Clays under their natural state; 2nd, Clays artificially combined with other materials. Then to give the names of some of the best white bricks known in the market. Facing bricks are then divided into four classes: solid plain bricks, solid moulded bricks, perforated bricks, and wall-facings, and the mode of manufacturing each description briefly sketched. The clays used for manufacturing white bricks are then referred to. Next follow, under their heads: White-brick clay must contain very little iron; descriptions of digging and weathering; dry grinding; screening and mixing-machine for ditto; pug hand moulding—1st sand-stock fashion, 2nd slop fashion; bumping moulded bricks, and fancy goods of three descriptions—moulded at the ends, moulded at the sides, moulded on the face; dressing with beaters; hand pressing; rubbing bricks; machine for cutting and rubbing bricks. Machine moulding is then described at length under the following heads: The first head, bricks formed by passing the clay through a pug-mill, with suitable mouth-pieces of three kinds: 1st, simple dies, plain or fitted with cores, to make hollow bricks; butting apparatus, with vertical roller guides, a great assistance to such presses; 2nd, the water-die system; 3rd, the roller mouthpiece

system; the second head, in which the clay is delivered into fixed dies, removable by hand; the third head, in which the clay is delivered by the pug-mill into dies, and subsequently pressed in the dies, and delivered from them by the continuous motion of the machine; the fourth head being that of Walker's Patent Press, in which the blanks or rough bricks are moulded and cut off by a pug-mill, and then pressed in a mould. Improvements capable of being made in this machine are described. Then the manufacture of perforated bricks by it. The difficulties experienced, and the way they were overcome. The mode of drying these perforated bricks. A machine for moulding hollow blocks for wall-facings is then described, with the method of working it. Difficulties in getting rid of the air, and how they were overcome. The adaptation of such a machine for making moulded blocks and bricks. The following details of manufacture are then referred to under their respective heads. Removing to hacks; drying-shed; covered hacks; drying-sheds. The kilns used for burning white bricks are then described; different sorts of kilns compared; the comparative waste in using them given. The advantage of placing kilns in groups, so as to utilise the waste heat from one to the other referred to. Crowding, setting, and burning described. Modes of testing heat of kiln. Description and quantity of coal used then stated. Drawing and stacking described. A summary then given of the cost of manufacture. Waste described as of two kinds—1st, Bricks actually useless; 2nd, Bricks of inferior quality. The expense of management and sundries, comprising repairs of plant and machinery, wear and tear of ditto, insurance, carting to station, and stacking in trucks. A general summary of all the expenses is then given. The selling price per 1,000, and the consequent profit. Then follow some memoranda referring to weather stains on white bricks, and the necessity of preserving the natural face of a brick. Some suggestions for improvements in the manufacture of white facing bricks are added in conclusion, as to form and colours, and a proposed improvement in the present mode of burning.

#### CONCLUSION.

Summing up the foregoing remarks, it seems to be clear that the best material for making a good white facing brick is a refractory clay, burning white or pale yellow, and a fine white or yellow sand which vitrifies slightly under a strong heat. That the best mode of manufacture is to grind the clay dry, mix it thoroughly with sand while dry, then pass it through a pug-mill, and then through a press, on the principle of Walker's patent. That the best and most economical kiln for burning these bricks is a down-draught kiln. That they should be protected as much as possible from the flame, and thoroughly burned in a dead heat. That the best shape to use is a hollow or perforated brick, made as large and light as possible. Many of the above-mentioned suggestions are no doubt perfectly well known to manufacturers; but the author thinks that some of the information may not be known to all, and believes that any manufacturer who will carefully carry out what has been suggested will be able to supply the market with a first-class white brick.

#### THE SUBURBS.—II.

IF the northern parts of London, or the "Northern Heights," as they are aptly called—as Highgate, Upper Holloway, Highbury, &c.—have their special charms of bracing atmosphere, elevated position, fine views, and open situation, so, also, has Southern London special peculiarities of an equally inviting kind. Although Southwark, Lambeth, and Clapham are flat and low, as a rule, Camberwell, Denmark and Herne Hills, East and

West Dulwich, and, beyond them, the rising ground of Sydenham and Norwood, are full of retreats as diversified in surface, and even more favoured by sylvan characteristics. Norwood, and the localities between Camberwell and Sydenham, are rich in wooded scenery, though here and there the speculative builders and kin societies called "Building Societies" are depriving the glade or the meadow of its pastoral sward, and the thicket and grove of their folial richness. We noticed one of the mushroom class of depredations in our last, its tendency to overspread every yard of open ground, to denude the open pasture, field, or wood of every vestige of its verdure, and to substitute in lieu thereof frail tenements of clay and fir, whose only merit is that they cannot last their lease. This class of house property—houses of rentals from about £28 to £40—seems to perfectly overwhelm the suburban dweller. A plot of land is forthwith taken and covered, that, at least, gave those who beheld it in its original bareness some open space and breathing-ground, whereon their eyes rested from the expanse of brick and stucco, and their children could play. With a rapidity almost startling, heaps of bricks obstruct the view and choke up the roadway, and ere they have diminished in bulk, beyond them slips of brickwork appear to bound the horizon, for the modern Balbus is building.

With a parsimony still more noticeable, the ground in the rear of the ornamented mask is dwindled to a few square yards, barely a perch; while the absence of privacy and security from a besieging fortress of a thousand eyes render the boast of an Englishman's home only a name. To take away acres of open ground, of low value commercially, and to parcel out in return such miserable pittance, is really an insult to the suburban dweller. See what a few yards more of garden or back yard would do. Irrespective of the financial return, it would enable each occupant to turn his back area into a patch of flowers or into a fernery or herbarium of some kind, adding thereby to the sightliness of the immediate neighbourhood and to the health of its residents. A small cooped-up outlet is worse than none, it becomes a place for refuse and filth; there is no interest in keeping it otherwise, and the consequence is the neighbourhood becomes to look squalor-stricken. We can point to estates and localities, once open and healthy, which have given place to these close-set nests of brick and mortar, in the neighbourhoods of Brixton, Clapham, and Camberwell; but as houses so built readily let, any remonstrance appears to be useless. Ideas of economy seem to dictate various kinds of expedients in these attempts at speculative art. It is very common to see in a row of houses the doors placed in pairs with a single pier of 9in. or 14in. between them. Sometimes there is not even a visible division, the stone landing or steps being made to extend the whole width of the two doorways, with a view, apparently, of economy. The idea is certainly a laudable one to make next-door neighbours friendly, or, architecturally, to combine under one archway the two doors; but it is, nevertheless, one hardly compatible with our English notions of comfort and privacy. It may so happen that Mrs. Smith and Mrs. Jones are not on the most friendly of terms, or that the most loquacious of those two individuals happens, by accident or otherwise, to be brought into rather communicative proximity with one of her neighbour's chatty tradesmen. We do not see the point of economy, while it is unquestionably more in accordance with our taste to place the doorways of adjacent houses as far apart as possible. The collision of neighbours and friends at the threshold of one's house is not always pleasing when the auditory nerves of some are so sensitive. Not only do separated doors add to the privacy of a row, but the interposition of the passage and hall becomes a highly



useful separation between two houses. Nothing can be more unpleasant, and to over-sensitive nerves more painful at times, than the sounds of the next house. Every step, movement, and even conversation is heard in these slightly-partitioned tenements, and nervous people are in a constant state of trepidation. This is caused, of course, by the want of a space between the two houses, and also by the contact with the thin party wall of the timber and flooring, which convey the vibrations. But even on other accounts the interposed passage or air-space between two houses is most desirable; it serves to lessen the risk of contagion and the spread of fire. Some more pretentious-looking houses are here and there observable, but they show invariably a love of outer display, or a taste for a Cockneyfied stamp of Gothickesque or Italianesque hardly in keeping.

Among the recent churches, we may notice one just consecrated, St. Peter's, Lordship-lane, Dulwich. It is of stone externally, with internal brickwork relieved by black brick and terra-cotta, the arches being of red brick. Mr. C. Barry is the architect. St. Giles's, Camberwell, though not an old church, is not a new one, and its architecture is significant as a standing reflex of the time when stone was considered the only material fit for a church, and plaster the only decent surface interiorly. It is of fine proportions, cruciform in plan, and of a florid fourteenth-century style overdone in detail, which, though of good design, is fast crumbling to powder. When we add (on good authority), the church is one of the earlier works of Sir Gilbert Scott, we need say little more, though we dare say its author would look back to it as not one of the maturest of his designs, and would probably think its ornament and detail rather gaudy and overloaded. Be this as it may, St. Giles can compete with many modern works of the same class in which a more florid ritual has taken the place of external ornament and beauty of proportion. The spire is a fine example of very florid character, and we may add there are few better examples of the kind about London; though it has much useless ornamentation wasted in friable stone—a lamentable sin of our best architects, and which in the case of a spire, to borrow a figure from a well-known Nonconformist, is like "throwing money in the air."

There are a few other interesting buildings we will notice on a future occasion.

## THE MANUFACTURE OF COLOURS.\*

(THIRD NOTICE.)

**L**AKES are a large class of red colours of great value in the arts. We have briefly described some of these. The process known as Mr. Wood's process, for the manufacture of carmine of a beautiful colour, deserves notice. It is said not to change by time, or by exposure to the air. 250 grammes of pure carbonate of soda, 225 of citric acid, are dissolved in 30 litres of water. When this mixture is boiling, 680 grammes of powdered cochineal are added, and the boiling continued for 1 or 1½ hours; the liquor is then filtered and cooled, and 250 grammes of alum added; it is then boiled again. After filtration the liquor is allowed to settle, the clear portion being decanted, the deposit being washed with distilled water, and dried at a low temperature. The carmine lakes are prepared with the mother liquors of pure carmine after the latter has been extracted. A solution of alum or precipitated alumina is stirred in the colour, which is brightened by a small quantity of proto-chloride of tin. The less the alum employed, the finer the lake; the commoner qualities are often thickened by starch. The precipitate is moulded into

troches and dried. The finest lakes are from fresh cochineal; the proportions used are 20 parts of powdered cochineal, 10 parts of cream tartar, in 400 parts of water. After boiling, the liquor is filtered and mixed with 300 parts of alum and a small quantity of proto-chloride of tin. The precipitated deposit is collected; the liquor, having a solution of carbonate of potassa added to it, a second precipitate is formed, and is washed and dried. In this manner the subsequent deposits are more or less rich in colour, as the latter solution is added in greater or less quantity.

MM. Bouchard and Clavel have proposed the substitution of red-lead by a Burgundy ochre. Another product, which they call *ferrugine alumineuse*, is said to replace red-lead advantageously, and has none of its defects. Iron minium, a colour preventive of rust, is also a good substitute, possessing all the good properties of red-lead. It is of a fine brown colour, mixes well with linseed oil. It covers more than red-lead, and is a better preservative against oxidation. No acid is used in its composition, nor is there anything in it injurious to the articles painted with it. Professor Loppens, of the Industrial School at Ghent, says "it is a composition that cannot be altered by any of the causes generally acting upon red lead, and which may replace the latter in all its uses."

The analyses show absence of any acid. One of these gives:—

Peroxide of iron . . . .	68.95
Aluminous earth (clay) . .	1.48
Burnt clay . . . . .	29.57

After experiments on painting, made by some Dutch engineers, the comparative weights were:—

Red-lead . . . . .	1.47
Iron minium . . . . .	3.13
and the specific gravities by hydrostatic process at 22° C.:	
Iron minium . . . . .	3.74
Red-lead . . . . .	8.24

Iron minium is prepared in the same way for painting as red-lead, or mixed with raw or boiled linseed oil. For thin coats a little litharge dryer is added to the ground mixture; turpentine does not improve colours. Mixed with bisulphate of mercury it may be used for painting the hulls of ships or other woodwork exposed to molluscs and the attacks of wood-boring insects. With white-lead, iron minium forms a very hard and excellent mastic, and mixed with coal-tar it forms a hard and permeating paint for wood. Iron minium resists heat, and may, on that account, be used to paint the insides of boilers to prevent incrustation.

That rich brown, known as "Vandyke brown," is derived from iron, and is very durable, and is prepared by calcining certain yellow ochres found in the South of France; or by calcining sulphate of iron till the colour is obtained. Mixed with red ochre, lamp or ivory-black, very durable browns are made of this colour. Of other well-known brown colours, Sepia, Umber, and Sienna, may be noticed. Sepia comes from a cephalopod, the cuttle-fish (*sepia officinalis*), and is extracted from a pocket filled with a brown liquor, with which the fish renders the water obscure when pursued by its enemies. The powder obtained is insoluble in water or alcohol, and is a very durable pigment. Umber comes from the island of Cyprus, and is a hydrated silicate of iron and manganese; while Sienna (raw or burnt) is an earthy substance from Sienna, in Tuscany, its colour being due to a hydrated oxide of iron.

We have not space to enumerate all the Blacks. Some are mineral, obtained by carbonisation of bituminous schists in closed vessels; some from bituminous coal, as by the process of M. Lavalleye; from burning nitrate of copper and peats, as ebony-black, or the calcination of chromate of copper; while other blacks are derived from vegetable substances calcined. The stones of peaches and apricots and other fruits; the carbonisation of

grape-vine clippings and stalks—the latter is used for copperplate-printing—cork, wine-lees, and other substances are used. These are calcined in close vessels and further reduced to a pulverised state by grinding.

Lampblack is a very large manufacture. It is obtained by the incomplete combustion of carbonaceous substances, and which burn with a fuliginous flame. Three kinds of lamp-black are known in the trade, prepared respectively from resin, tars, and vegetable oils, and known by these names. The oil blacks give the finest and purest products. The process of manufacture in all cases is nearly the same; the smoke from combustion of the resins and oils is collected in cones of cloth, or is allowed to settle in compartments or sacks with receivers underneath; the finest qualities of deposit being from those farthest removed from the flame or lamp. A great many blacks are made by the carbonisation of bones, known as bone-blacks. Ivory-black is a product so formed, the ivory scraps being thus calcined. China or Indian ink is a well-known black among architects and draughtsmen generally. Its basis is the finest and purest oil lamp-black. China lays claim to its invention, and for a long time monopolised its manufacture. Perfect imitations, however, are produced in this country. As interesting to the profession generally, we give the following formulæ for its preparation, which is said to be equal to the best China ink:—Calcined lamp-black, 100 grammes; shale-black (boghead) in powder, 50 grammes; indigo carmine, in cakes, 10; carmine lake, 5; gum-arabic, 10; purified ox-gall, 20; and alcoholic extract of musk, 5. The ingredients are incorporated in a solution of gum and water, filtered through a cloth, and the whole ground with a muller. The ox-gall and musk is added to the paste, which cannot be too well ground; the product may be then dried and moulded.

Greens are derived from earthy matters, as green Verona earth, which was used by the Greeks and Romans, and is very durable. Verona and the island of Cyprus generally supply the trade. M. Berthier's analysis gives a large proportion of silica (about half), and protoxide of iron, with alumina, magnesia, soda, and water. These earths are found in porphyritic and basaltic rocks. Malachite, found in Siberia and other parts, called also "mountain green," is a hydrated carbonate of copper. Finely pulverised it gives a magnificent green, too expensive for common use. Sap green is a vegetable green, the juice of the buckthorn berry. A very bright green, employed for artificial flowers, is the "Picric acid green." The Bremen green is a hydrated oxide of copper; Scheele's green, and some others, are derived from combining oxide of copper with other substances, and though possessing great brightness, are highly poisonous—a neutral arsenite of copper is the basis. Scheele's green was much used for paper-hangings, but is now replaced by Schweinfurt's green, which is more durable; this is a combination of acetate and arsenite of copper, and several processes are mentioned. In some of them equal quantities of sulphate of copper, arsenious acid, and carbonate of potassa are employed. We doubt, however, whether any of these arsenical greens are really harmless. In Germany, a green without arsenic is made as a substitute for Schweinfurt's green, and although not so bright, is very durable and has more body. The composition, according to analysis, shows 80 per cent. of basic carbonate of copper with chromate of lead, carbonate of lime, and oxide of iron. Copper salts and lime, or chromic salt, produce a variety of green hues. Greens from oxide of zinc, combined with protoxide of cobalt or iron, have also been recently introduced; the colour, however, is fugitive in some cases. Emerald green is a chromium compound prepared probably with boric acid. Mineral green lake is a mixture of the oxides of copper and zinc, and is very durable. We have no space

\* "On the Manufacture of Colours for Painting." By MM. RIFFAULT, VERGNAUD and TOUSSAINT. Translated by A. A. FESQUET. Philadelphia: H. Carey Baird.



to describe other greens, though the subject is an interesting one. We will here just allude to a process for the manufacture of colours with the oxide of zinc proposed by Messrs. L. Ador and Abadie. The oxide forms the basis, and is obtained by the decomposition of the salts of zinc by heat. The advantages claimed are economy and salubrity. The mixtures of metallic salts with sulphate of zinc produce a variety of colours—yellows, greens, grays, bronzes, pinks, white. The investigations also of Messrs. Barruel and Leclaire, and Mr. R. Wagner, may be mentioned here.

We conclude our notes from this valuable work on Colours by making a few remarks on the drying and adherence of colour. M. Leclaire has found that the peroxide of manganese is preferable to litharge and other oxides as a dryer for zinc-white. This drying oil, composed of boiled linseed oil, and a small quantity of the powdered peroxide, is employed in the proportion of five to ten per cent. of the weight of zinc-white. Drying oils can be rendered thicker also by combining lime with the oxidised oil, or with resins. Messrs. Guynemer and Zienkiewicz have also inquired into the subject of a drying oil without litharge or any oxide of lead. The latter chemist has given preference to the urobzenzoate, and to the borate of manganese. The researches of the illustrious chemist Chevreul, in the *Annales de Physique et de Chimie*, have shown that the hardening of white-lead and zinc-white paints is due to the absorption of the oxygen of the air; that pure oil hardens independently of the dryer; and hence the dryer is not the *only* cause of drying; but the painter must consider all the causes producing the effect of drying. The following are some of the important results obtained, showing that different substances act as dryers or anti-dryers:—

Linseed oil, one coat upon glass, dried in 17 days.

The same oil, mixed with oxide of antimony, took 26 days; while the same mixture applied upon a cloth painted with white-lead, was dry in 14 days.

The same oil mixed with arseniate of protoxide of tin, and applied to the same cloth, was not hard after 60 days.

Of wood, Norway fir was found to be less anti-drying than poplar, and poplar less so than oak; the latter wood appearing to possess the anti-drying property to a high degree, three coats of oil taking 159 days to dry. Linseed oil applied to different metals dried after 48 hours, showing that the surfaces do not always account for the drying. "Linseed oil is naturally drying, and this property increases almost always by its admixture with white-lead, and, in certain cases, with oxide of zinc. If the mixture be not sufficiently drying, recourse may be had to an addition of oil boiled with litharge or manganese." The nature of the surface painted, the number of coats it has had, and the temperature of the air, light, &c., should be all considered by the painter. "A very drying oil will be obtained by heating linseed oil for three hours with 15 per cent. of metallic oxide, and at the temperature generally adopted by colour merchants."

An Appendix upon "Oils, Varnishes, and Colours," and their manufacture, concludes this very complete and useful compendium on the manufacture and preparation of colours, which we cordially recommend.

M. Lecompte proposes to utilise the power of the tides to bore the proposed tunnel between France and England, the power of the tides being employed to compress air to work the boring machines. It is only in special situations, however, that this power could be economically employed, as its adoption implies the use of great reservoirs with a narrow opening, in which would be set the machines on which the tidal waters would have to act.

A new church at Ditton, Liverpool, dedicated to St. Michael, was consecrated on Tuesday. The building, which has cost £2,225, consists of a nave, chancel, and transepts. Mr. Grayson, of Liverpool, was the architect, and Mr. W. Middlehurst, of St. Helen's, the builder.

## ENAMELS AT SOUTH KENSINGTON.

THE following are the comments of the *Pall Mall Gazette* on this collection:—

"Considered from the lowest point of view, and merely for their effect as means of decoration, enamels are very pretty and bright. Even the old Japanese, often very dingy, and the black Limoges, when used in combination with more showy objects, produce a pleasant harmony. And the pale blue Chinese work, the Mediæval *champlevé*, the modern miniature and jewel work, are all full of brilliancy. In fact, the general effect of the exhibition now about to close has been simply dazzling. The eye wandered from case to case unable to fix itself, and while some pieces stood out pre-eminent it was quite possible to overlook wholly some of the most important. The range was very wide—too wide perhaps. It took in ancient reliquaries as well as Battersea candlesticks, iron fire-dogs, and heraldic coffers, ivory carvings, and Chinese bronze. Enamel has been employed in so many ways and in combination with so many other kinds of ornamentation, it has flourished in so many countries so far apart, and has been used from such remote times, that a student is now obliged to study it with his head full of many different kinds of art, and many opposite and even conflicting schools. It is not very easy for the same mind to admire a miniature by Bone and a Venus by Cellini, a Byzantine saint and a hunting scene by Courtoys, a Japanese monster and a garter plate. Book-covers and bead necklaces have been made of enamel as well as shrines for relics and minute statuettes. The number of uses to which it has been put is only more remarkable than the comparative neglect under which it now struggles as a living art. But it must be allowed that as an advertising medium it has great advantages, and that the names of railway stations are very well displayed in work closely resembling Limoges. Some ancient fire-dogs in one of the cases were of iron and brass enamelled with the royal arms in colour, and perhaps this peculiarly English art may have a further revival. But miniature painting in enamel does not seem to flourish at the present day. A corner is still reserved to it at the Royal Academy, but no critic has ever been known to give it a paragraph.

"It is very possible that the oldest work in the Loan Collection comes from China or Japan. One piece, a jar from the Summer Palace, is dated, and the date corresponds with our year 1454. But we do not know much about the history of Oriental enamels. This particular vase has a look of great age, and so has a very beautiful jar near it, the surface being quite rough, as if the process by which the face of the hard enamel was afterwards ground down and smoothed had not yet been invented. Another very interesting piece is also Chinese. It is a small bowl of a brown colour, most delicately ornamented. It may be very ancient, but looks very fresh. It is easier to approximate to the date of some of the European work. The magnificent reliquary from the Solytkoff collection, with its domes and pillars, its delicately diapered panels, its ivory saints and golden griffins, is probably a German work of the middle of the twelfth century. Nothing can be more gorgeous than the effect it produces; nor is it wanting in minute and careful finish, and a variety of design which shows the fertility and originality of the school which produced it. In the same and the adjoining cases are many other examples of the same period. Triptychs, especially one which was formerly at Alton Towers; caskets, with Apostles painted on them, or martyrdoms, or Nativities; chalices, one in particular painted with scenes from the Passion; and half a dozen pastoral staves, most of them ornamented with a figure of St. Michael slaying a dragon, whose gorgeous scales and glowing tongue are worthy of all admiration. A book-cover contains some plaques of enamelled ornament, but it may be questioned whether the whole design was not made up of various pieces some time in the fifteenth century. These ancient German examples are well worthy to be compared with the Oriental; and in many respects a similarity both in design and colour may be traced between them. Whether any *champlevé* work was done in England in the thirteenth century does not seem to be decided. But England possesses two remarkable examples. The tomb of Aymer de Valence, in Westminster Abbey, is covered with exquisite engraving, into the recesses of which enamel has been worked. His great shield is worthy of the best school. And in this exhibition a little casket occurs, ornamented with the same heraldic bearings and others, and very possibly made by the

same hands as the monument. But it would be going too far to say either of them is of English workmanship.

"If the palm for antiquity must be divided between China and Germany, that for beauty must also have a double award. The difference between the work of the great Limousin artists and that kind of sculpture in miniature to which the name of Cellini has been attached, rightly or wrongly, is so great that there is practically no comparison between them. When the lattice work which outlines *cloisonné* and gives it a name had been abandoned for pure painting on metal, Limoges seems to have almost monopolised the art. First came the coloured and quaintly designed pieces, of which very few examples are shown, and then the comparatively severe school of grey and black in which the best work was produced. Perhaps twelve plates, painted with scenes appropriate to the rural employments of the months, would be considered the best examples of this style. But they are very nearly approached by two sets of pictures representing the preaching of John the Baptist, and by an oval dish painted with the nine Muses, and profusely ornamented with delicately pencilled scrollwork in gold. There is something very fascinating to the eye in the pearly greys, the deep blacks, and the pure flesh tints of this style. It even penetrated into the manuscript illuminations of the time, and some exquisite examples, almost to be mistaken for enamels, are extant. It would have been very instructive if the managers of the exhibition had been able to show a few specimens of the *grisaille* miniatures found in missals and prayer-books.

"The coloured work of the Courtoys and their school is well represented. The translucent enamel with its metallic lustre is not easy to harmonise, and the effect of the greens and purples with the usual black background is seldom quite satisfactory. Where colour was very sparingly employed in combination with the severe *grisaille* the effect was more pleasing. A casket of very late date, painted with dancing figures, is perhaps the best example; but several ewers, some of them very richly ornamented, and, besides, beautiful for their form, are perhaps better types of the style.

"In Cellini work some of the most valuable things exhibited are to be found. Among them are Mr. Beresford Hope's onyx ewer, which has often been described, and Lady Mount Charles's necklace, the most remarkable specimen extant. Each link is formed of a group from the scenes of the Passion, wrought in microscopic sculpture, each little figure enamelled in its proper colour, and each group surrounded with jewels and tracery of the most delicate description. Whether Benvenuto wrought this chain or not is a very little matter. To believe he made it would add greatly to our opinion of his powers. To suppose he did not make it will not depreciate it in the least. A large number of other works of a similar kind are in the case with this necklace, and some examples of the late Spanish work, of which the Museum recently acquired so many objects, few of them really interesting.

"Strange to say, the exhibition has received much less attention than it deserves. Now about to close, and having been open for several months, very little interest has been taken in it; but all who have seen it agree that no such collection has ever before been gathered."

## CHIPS.

The erection of a new post-office is contemplated at Hanley.

New Infants' Schools at Weston-super-Mare were opened on Tuesday. The buildings will accommodate 205 children, and were designed by Messrs. Price and Groslioz, architects, and built by Mr. G. H. Pocock, the cost being for £685. The structure is of blue lias, with freestone facings.

St. Paul's Church, Forebridge, near Stafford, was reopened on Sunday week, after redecoration.

The parish-church of Garthbrenny, near Brecon, was reopened on Wednesday week, after restoration.

On Thursday week the memorial-stone of a new English Presbyterian church was laid at Middlesborough. The building will accommodate 700 people at a cost of £3,000.

The nave of the Priory Church of Gilbert of Sempringham, Malton, was reopened on Thursday week, after restoration from designs by Mr. Fowler Jones, architect.

Mr. A. Bedborough has been appointed architect to the Royal Aquarium and Summer and Winter Garden Society (Limited).



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## OUR LITHOGRAPHIC ILLUSTRATIONS.

## NEW CONGREGATIONAL CHURCH, GOOLE, YORKSHIRE.

THE new Congregational church and schools about to be erected at Goole (of which we this week give plan and perspective view) are designed to accommodate about 360 persons, with transept in addition appropriated for sittings for 100 children. The nave or body of the church will be 61ft. long by 36ft. wide in the clear, and the sittings are so arranged that every person will have an uninterrupted view of the pulpit, the interior of the building having been planned thoroughly for congregational use. The pews will be 2ft. 9in. from centre to centre, 20in. being allowed for each sitting. An apsidal chancel containing choir seats is arranged at the pulpit end of the building, with organ-chamber and vestry on either side. The chancel will be only of sufficient size to comfortably accommodate the choir, as no unnecessary expense is considered desirable in this part of the edifice. The nave will have an open-timbered roof, the height up to the wall-plate being about 18ft., and to the underside of the ridge about 35ft. The floor level of the church will be 13ft. above the finished level of the main road, and will be reached by a spacious staircase of stone, the main entrance being through the tower facing Hook-entrance and the river. The schoolroom and classrooms will be under the church, very spacious, well lighted, and ventilated. The Sunday-school (forming also a room for public and tea-meetings) will be about 40ft. long by 36ft. wide, lighted by large windows along the sides. The infant-school will be under the chancel. Four classrooms will be immediately provided, with provision for two additional rooms at a future time. A small kitchen, with boiler (for tea-meetings) is provided, also heating apparatus, coal-cellar, and the usual offices. A staircase is arranged so that the Sunday-school children can be taken into the church without going into the open air. The building will have a tower and spire, rising to a height of about 140ft.

Mr. Thomas Porter, of 5, Westminster Chambers, is the architect.

## PAVEMENT IN CHAPEL OF ST. REMI, RHEIMS.

Originally designed for a convent in the neighbourhood of Rheims, after many vicissitudes, this pavement is now laid in a chapel south of the choir of the Church of St. Remi, at Rheims. It is illustrated in a lead inlay with Old Testament subjects; many of the slabs are lost, and the remainder arranged apparently in no order. The accompanying illustration gives a selection from those now in the chapel, but without reference to either their present or former arrangement. The slabs are 2ft. square. We are indebted to the courtesy of Mr. Aston Webb for this interesting sketch.

## HIGHLANDS, GLOUCESTERSHIRE.

This house, though built in a stone district, was, after much consideration, constructed with timber framing, owing to the impracticability of obtaining a reliable foundation for walls of masonry. The external framework is of English oak timber, so put together that in case of any slip in the ground below, the body of the house shall stand firm, and simply require packing from beneath. The space between the timbers is filled in with Dennett's concrete, with oak laths and cement facing in front, the whole boarded inside, and afterwards felted, battened, and plastered. The floors are constructed with fir beams, over which is laid Dennett's concrete, and upon that

the usual boarding. On the ground-story the ceilings between the beams are panelled and ribbed with deal, and varnished. In the upper stories the ceilings are formed between the beams on the lower surface of the concrete. The whole structure is simple in character, but very substantial, and stands on a site of remarkable beauty, about 600ft. above the sea-level. The slope from the house is so rapid as to require a succession of terraces for flower-gardens. The first terrace is constructed of masonry on the site of the old house, which failed for the reason first stated, the space beneath the garden being utilised for a series of rain-water tanks and other purposes. There are two terraces below, each of earthwork, laid out with flower-beds. The work has been well carried out by Mr. Estcourt, of Gloucester, builder, under the direction of Mr. Ewan Christian as architect.

## ROYAL ALBERT ASYLUM, LANCASTER.

This building, which will accommodate 600 inmates, stands facing west upon a commanding site of 65 acres of ground, and (about 150ft. above the sea-level), half a mile to the south of Lancaster, adjoining the London and North Western Railway. The whole of the exterior is built of durable light-coloured freestone, quarried within a quarter of a mile from the building, relieved with a certain amount of red stone. The outside walls are lined with brickwork, having a small cavity between the brick and stone. The roofs are covered with green states, from the Coniston quarries. The general arrangement of the plan is very simple, and something in the form of the letter E; the main front, facing westward, being represented by the thick upright stroke with two wings at the north and south extremities, projecting 58ft. from the main building, and running back 185ft. and 210ft. respectively, and a central projection of 40ft., extending in an easterly direction to a distance of 324ft. The greatest length from north to south is 472ft., and from east to west 324ft., the total area covered being 6,650 square yards. The principal entrance is in the centre of the main front, and opens into a large entrance-hall and staircase leading to the board-room and secretary's office. To the right is the residence of the superintendent, to the left the matron's room, waiting-room, &c. Facing the entrance is the large dining-hall, 70ft. by 35ft., capable of accommodating three hundred inmates. Immediately behind the dining-hall is the kitchen wing, containing a large kitchen 43ft. by 35ft., scullery, pantries, servants' hall, &c. Beneath are the bakeries, storerooms, &c., communicating with the kitchen by a hoist. To the east of the kitchen wing, at a distance of 40ft., and connected by a corridor, is the workshop block, 140ft. by 66ft., containing workshops for the carpenters, painters, shoemakers, &c.; engine-house, and smithy, over which are the washhouses, laundry, &c. Immediately adjoining the entrance hall, and branching off to the right and left, are the principal corridors, 9ft. wide and 130ft. long, communicating with the various apartments and the corridors of the wings. The rooms on the west side of the corridor, both on the right and left, are reserved for first-class patients, those on the east side are occupied by the schoolmaster, schoolmistress, and attendants. In the north and south wings are the schoolrooms, dayrooms, dormitories, baths, and lavatories, and at the east end of the south wing is the residence of the house-steward. The basement-floor is entirely above ground, owing to the natural slope of the ground, and is chiefly appropriated for general storage of provisions, ironmongery, coals, drapery and linen, larders and dairies, tailors' and uphol-

sterers' shops, and playrooms. The principal entrance to the basement story is at the east end of the central block, where goods and stores are delivered, and deposited for use. In the south wing are workrooms, large playrooms for the use of the male inmates in wet weather, and the kitchen and offices of the house-steward. The first floor is generally appropriated as dormitories, and the boardroom and offices are over the principal entrance. The second floor is similarly appropriated, and will be used as dormitories when required. The total cost, including all fittings (except furniture), lodges, boundary-walls, &c., but exclusive of farm-buildings, cost of site, architects and clerk of works, amounts to £63,742. Mr. Baynes, of Lancaster, was the contractor for the masonry; Mr. Blades, of Lancaster, for woodwork; Mr. Goulding, of Kendal, for slating; Messrs. Johnston, of Carlisle, for plastering; Mr. Walmsley, of Preston, for plumbing, glazing and painting; and Mr. Seward, of Preston, for heating by hot-water. Mr. Bennett, of Liverpool, supplied the fittings of washhouse, cooking apparatus, &c.; Mr. Sharpe, of Lancaster, the ironwork; Mr. Fawcett, of Lancaster, the chimneypieces; and Mr. Seward, of Lancaster, the firegrates. Mr. John Combe acted as clerk of works, and Messrs. Paley and Austin, of Lancaster, were the architects. There are complete farm-buildings in connection with the institution.

## THE BAPTISTERY OF THE CHURCH OF ST. CLEMENT, WORLABY, LINCOLNSHIRE.

One of our illustrations represents an example of an inclosed baptistery, the completion of which is about to be carried out from the design of Mr. W. Scott Champion, architect, of Guildford-street, Russell-square. The baptistery is the presentation of Lady Astley, and occupies the ground-floor of the tower, which is at the west end. The floriated screen will be a suggestive feature when finished, and will be partly gilded. The floor is tiled. It may be added the church of St. Clement's is a new structure, and is rebuilt on the site of the ancient church, which was in the Norman or Transitional style, and the circular arch seen in our view is the old arch restored. The new church is in the fourteenth-century style, and is of freestone, with Ancaster dressings. It has a nave, side aisles, and chancel, and cost about £5,600.

## GRAND DOORWAY, CHURCH OF ST. MARTHA, TARASCON.

A fortnight since our lithographer made a mistake by substituting some details of "Monastère de l'Assomption" for this doorway. We now give the doorway, which was described a fortnight since, and we shall describe the details then given when we illustrate the Monastère itself.

## CHIPS.

A new Methodist Free Church has been erected at Huddersfield; cost, £3,000; architects, Messrs. J. Kirk and Sons, of Dewsbury and Huddersfield.

A new Roman Catholic Church will shortly be commenced at Cambridge Town, Farnham. The plans have already been prepared by Mr. E. W. Pugin, and the church will have a fine frontage to the main Bagshot and Blackwater-road.

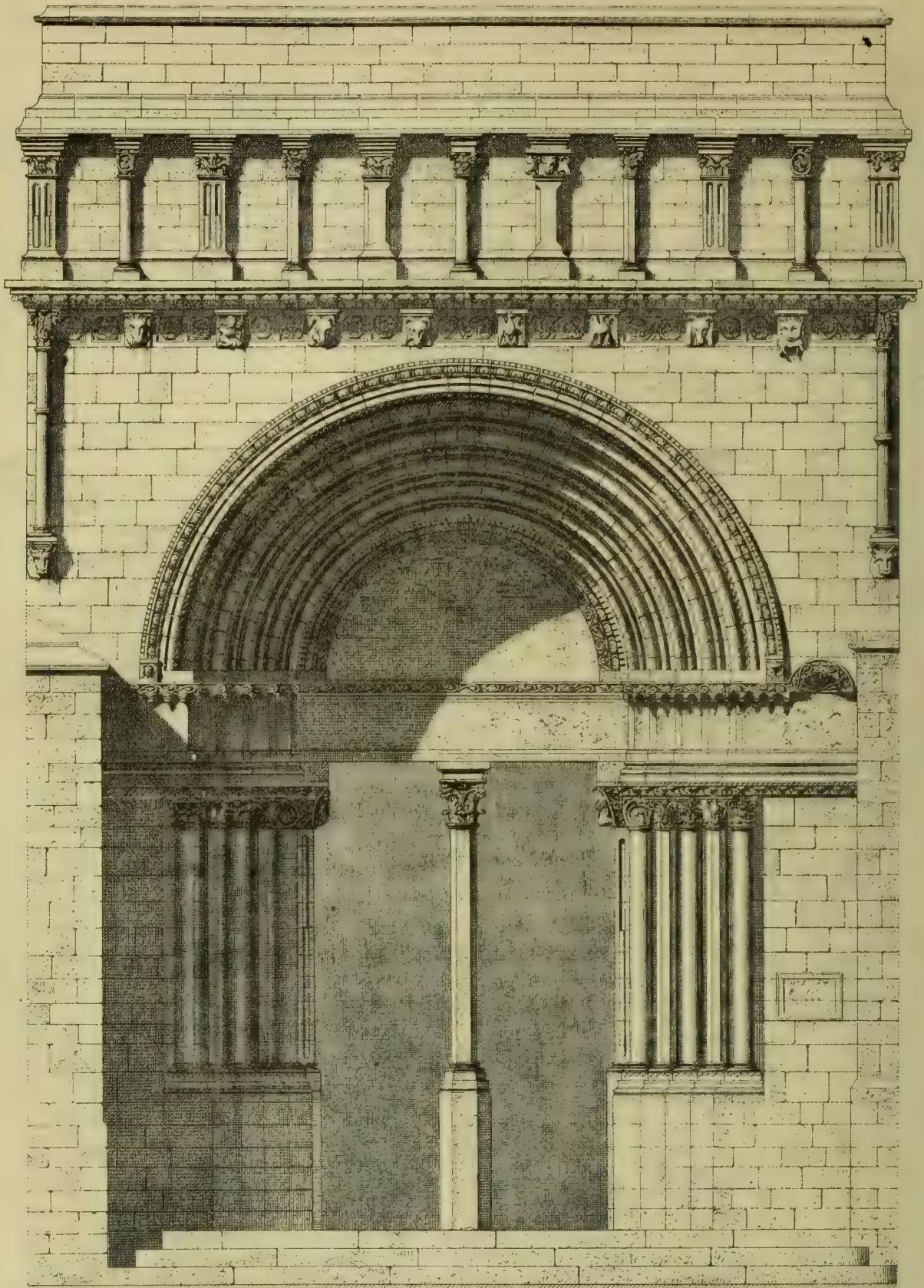
The parish-church of Shotley, Suffolk, was reopened on Sunday last, after restoration by Mr. Hawkins, of Monks Eleigh.

On the site of the old Whitecross-street Prison the Midland Railway Company are about to erect an extensive goods station and range of warehouses forming their City goods depot. The warehouses, built of red brick, with Portland stone dressings, will, when completed, be among the loftiest buildings in the City, the total height being 80ft. The cost of the building will be £130,000.









Élévation

GRAND PORTAIL LATÉRAL

Echelle du Plan

2 mètres

2 mètres

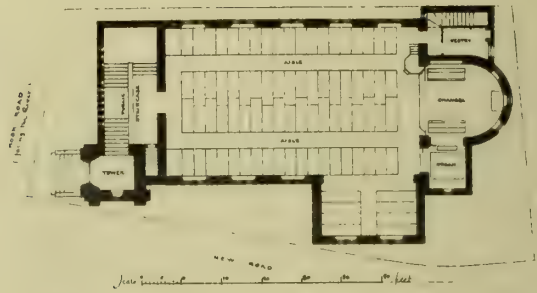
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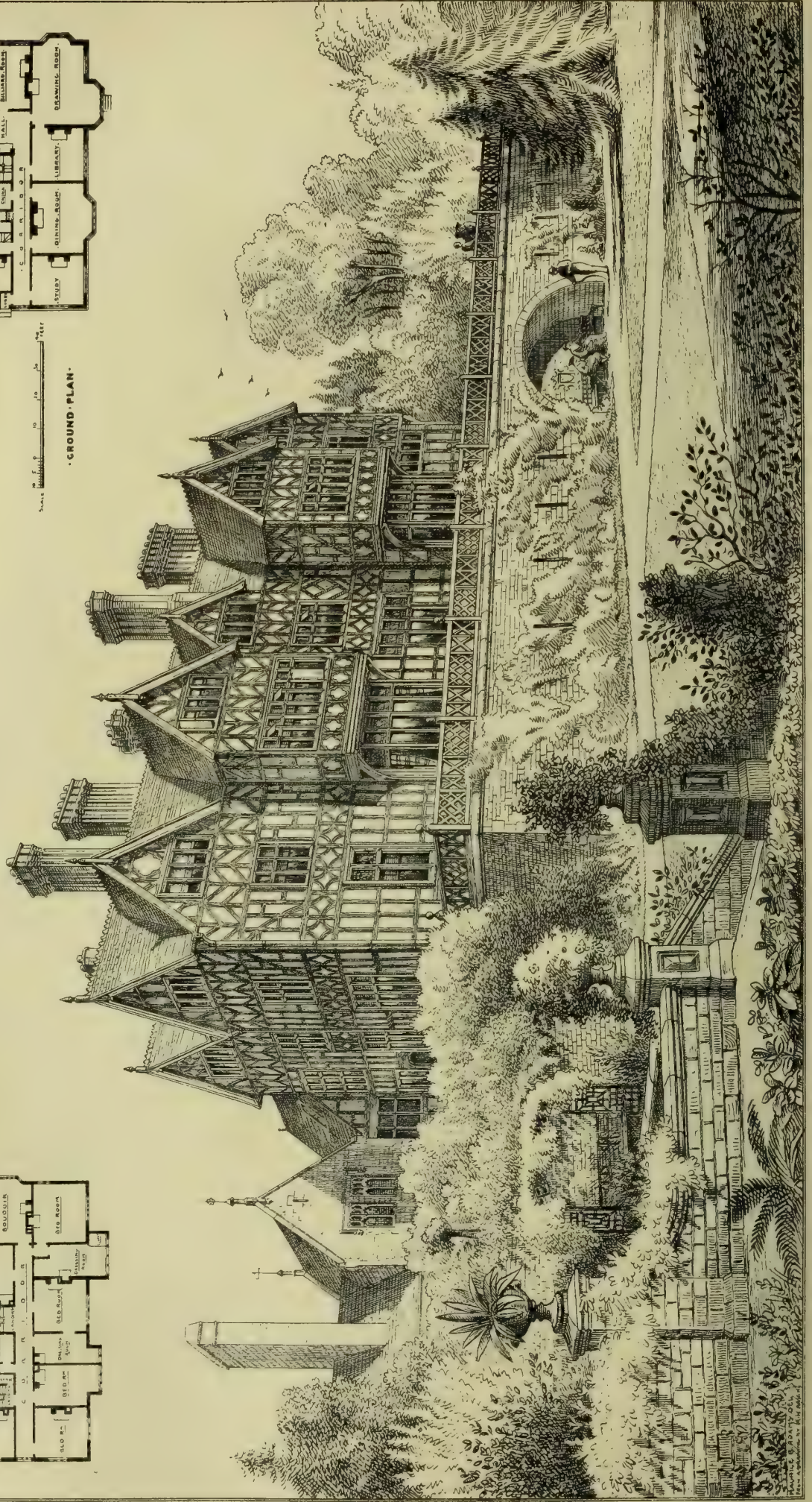
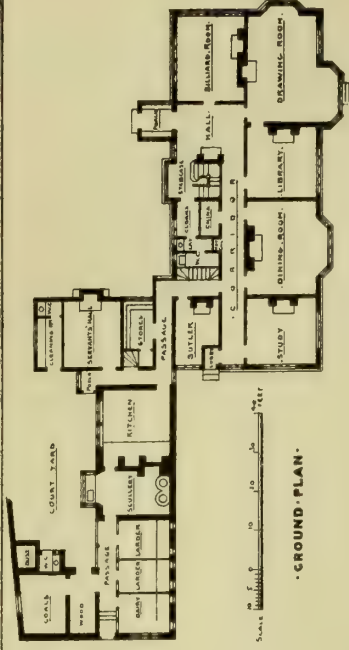
Congregational Chapel and Schools GOOLE YORKSHIRE. Thomas Porter Architect.



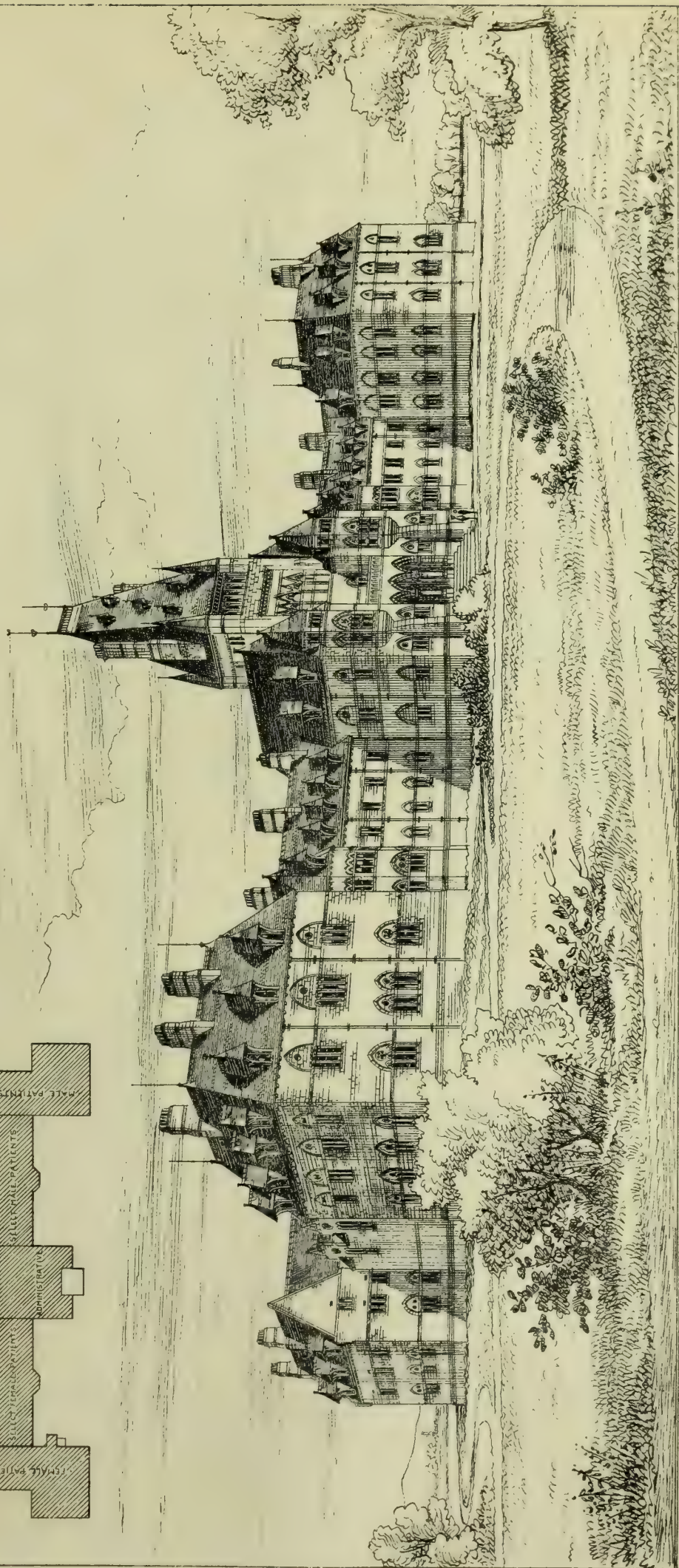
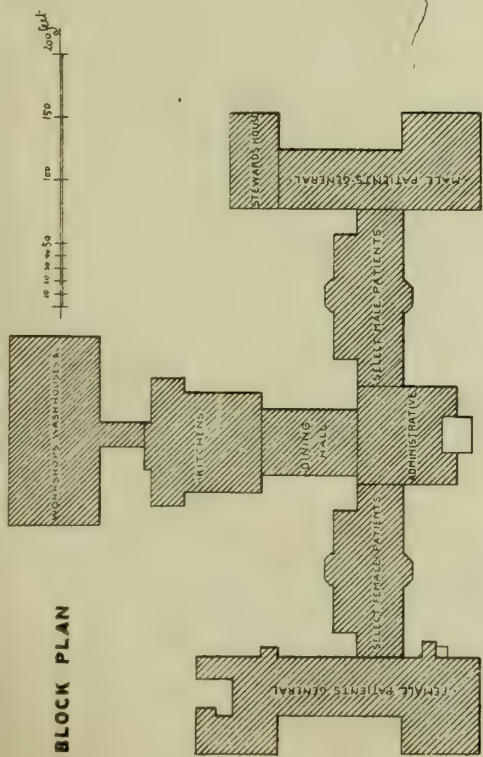




THE HIGHLANDS, GLOUCESTERSHIRE . N.W. VIEW  
 EWAN CHRISTIAN, ARCHITECT.







The Royal Albert Asylum for Idiots : Lancaster :

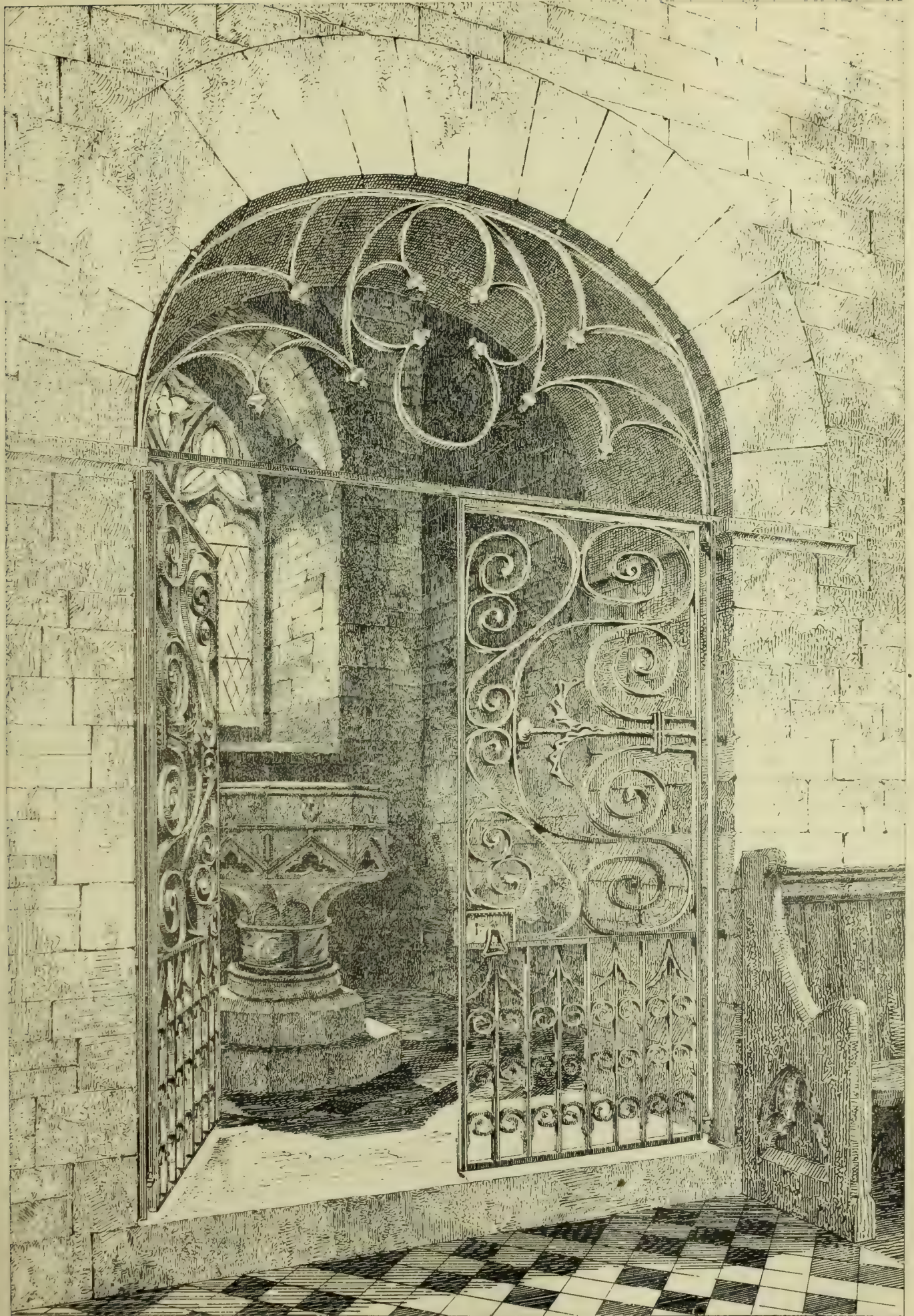
by Paley and Austin Architects Lancaster

Photo Lithographed & Printed by James Alcock, 57, Great North Road, W.C.







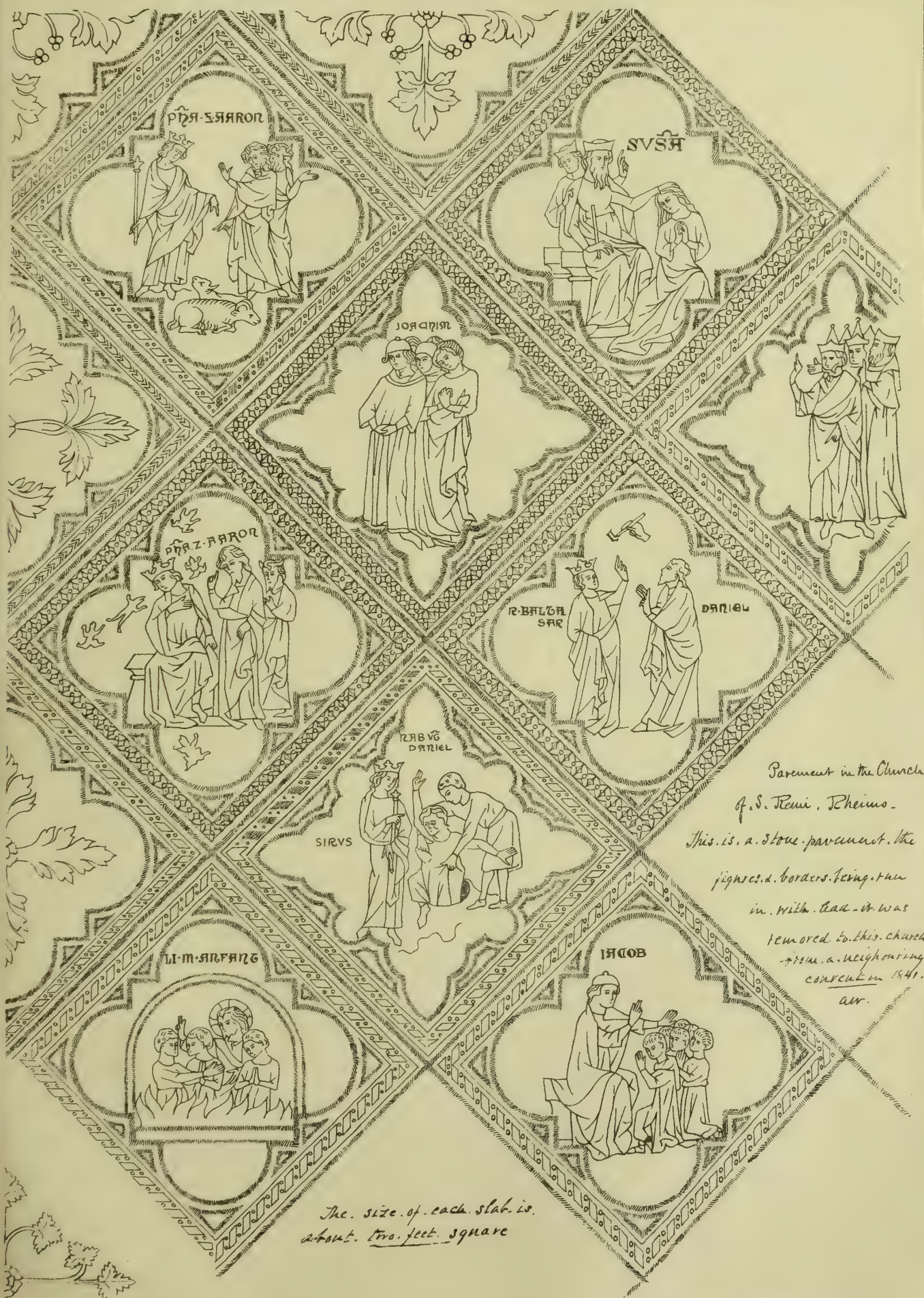


The Baptistry of the Church of S. Clement, Worlabye, Lincolnshire, for Sir John Dugdale Asley Bart. & W. S. Champion ARCHT.









Pavement in the Church  
of St. Remi, Reims.

This is a stone pavement. The  
figures & borders being run  
in with lead - it was  
removed to this church  
from a neighbouring  
convent in 1841.  
ant.

The size of each slab is  
about two feet square







## ANCIENT AND MODERN FURNITURE AND WOODWORK.\*

(SECOND NOTICE.)

BYZANTINE art took its form from Constantinople, where the arts of Rome and Asia combined to give it a distinct character. There is much in the furniture and woodwork of this period that demands our admiration. The new elements that were brought by the barbarian races of the East and North seemed to have imparted a new life to the declining Classical art of Rome, and the influence of the new religion tended in the same direction. The precious metals were more used in the furniture of Constantinople than they were in Rome. The Eastern races brought jewels and valuable articles to the new seat of empire, and the arts of furniture and dress naturally became the objects of this new wealth. Chairs, couches, and chariots were often of massive gold. Caskets and ivories of all descriptions can be seen in the Museum at Kensington, and are described in Mr. Maskell's work on "Ivories." The diptyches show consular chairs and thrones of great variety and beauty. Some of the chairs are like the folding curule chairs of Rome, with sculptured legs representing lions and leopards, whose heads hold rings for carrying the chairs. Medallioned frames and winged figures of Victory often adorn the sides of the seats. The chair of St. Peter, in Rome, is a massive and handsome example, and is one of the most ancient relics of wooden furniture preserved. A woodcut of it is given in Mr. Pollen's work. It has a square-framed back, with pedimental top and perforated tympanum; under this the back is relieved by open arched work. The legs are upright, and the seat-frame is mortised into them. As a rule, the Roman type prevailed, though a richness of ornamentation is observed in the Byzantine art hardly seen in Roman work. The chair of St. Maximian of Ravenna is another specimen that has survived the Early Christian era. Many relics of this art suffered doubtless under the sect of the Iconoclasts, who came into power early in the eighth century, and who destroyed religious sculptures and antique works of ivory and wood. Architectural woodwork handed down many forms and elements of Byzantine and semi-Greek art, and we find them reappearing in the woodwork of Rhenish-Byzantine, the late Middle-age, and Renaissance eras.

Of Mediæval furniture and woodwork, few examples exist before the eleventh century. Classic art, while it furnished types and symbols, was completely changed in the hands of the Mediævalists. Oriental influences pervaded the semi-Classic taste, both in architecture and the subsidiary branches of art, and only in Italy did the Classic feeling linger. Metallurgy, so far as the precious metals and bronze were concerned, was continued in Britain after the Romans had left its shores. Saxon ornaments in gold, bronze, and enamel are to be seen at Kensington, and a large collection was dug up at Faversham in Kent. These are chiefly brooches, buckles, horse trappings, and other minor ornaments of dress; and Mr. Pollen thinks we have every reason to believe that Saxon thrones, tripods, and other objects of household furniture, were also made. Italy excelled also in the metallurgic arts. In the Museum is a cast of the bronze chair of Dagobert in the Louvre. The original is partly gilt, cast, and chiselled, and is minutely described by Mr. Pollen. It is of a Classical form, though of the seventh century; the legs, cast with tiger-heads connected by cross braces, are of bold and good design, the heads facing sideways; they are treated conventionally, but with claw feet. The diagonal braces, united by a centre rivet, slide in slots formed in the insides of the legs, so that the seat can be folded. Side arms are fixed to the heads of legs, and are formed of bands and fastened

to the seat by interlaced hoops. These arms are finished with knobs, and the back is traceried bounded by inclined rails at the top. The artificer was St. Eloy or St. Eligius, Bishop of Noyon, who made various ecclesiastical ornaments and utensils. Under Charlemagne, the arts of the West, especially metalwork, were encouraged.

Early Mediæval furniture, like architecture, was more or less Romanesque in character; sculptured figures and draperies were stiff and archaic, and sacred legends and emblems took the place of Classic forms. Animals of the chase and chivalrous adventures formed the staple art ideas, together with the sacred emblems. The comforts and conveniences of social life, however, were mainly subordinated to the church, and therefore we cannot expect to find the arts of social life of the early Mediæval times at all commensurate with the furniture of the Church. Everyone has seen illustrations of Anglo-Saxon furniture, bedsteads and tables, and the rude kind of art that characterised them. Italy, Venice especially, exhibited at this period traces of the older Classic art and far greater social refinement; and the inlaid wares, wood and ivory carvings, silks, and tissues imported from the east and south, enabled Italian art to retain a supremacy. Norman influence greatly changed the arts of social life in England; fireplaces were introduced in some of the rooms, and the addition of upper stories to houses, (*solaria*) or light rooms, gradually increased the comforts, and with the comforts the furniture of Norman England. Tables stood on trestles, seats were simple benches, and *armaria* or cupboards were introduced. The wooden cupboards or chests were not framed, but had ledges, and the ledged doors and clamps, cross bars and floriated hinges, still find copyists among our modern Mediæval imitators. Painted rather than carved ornamentation was applied to woodwork.

In the thirteenth and fourteenth centuries a more scientific mode of construction began to be adopted. Framing took the place of ledged work, and the chests and other kinds of woodwork were decorated with metal or hammered work, plates and hinges, bosses and heraldic devices. Portable furniture and hangings appear common in royal journeys, and chests containing the jewels and valuables were conveyed on the backs of mules or sumpter horses. The journey of Eleanor of Provence to England, on her marriage to Henry III., was accompanied by their furniture. Till the fourteenth century candles were placed on beams in the halls. In Henry III.'s reign iron chandeliers or brackets to the piers of the halls were introduced. Candlesticks for the table came into vogue later. The hearths stood in the centre of the halls, the smoke ascending through a lantern above it.

No species of woodwork becomes so suggestive as the room panelling or wainscoting introduced at this period. Norway pine was used; and Henry III. had panelled his queen's bedroom and a chamber in Windsor Castle of this wood. Linen-chests and settles were panelled, the former served as tables, and often had chessboards on them. Later, chests of Italian make also show the same use of the lid (see 7223 '60 in the Museum). Cupboards and beds were also of panelled wood during the time of Edward I. Tapestry also was generally used, though hangings were common in churches at an earlier period. Coffers often had panelled backs and arm-pieces at this time, which were the germs of the later cabinet. Raised dorsals or backs of seats in large rooms protected from draught, and in old farmhouses and inns even now the same construction is observed in the old "settles." This type of seat gradually grew into state and canopied oaken thrones in great halls. During the fifteenth century, the canopy or hood became attached to the panelling of the end of hall, and covered the whole of that side of the dais. Embroidered and heraldic covered hangings sometimes

took the place of the back and hood. *Dressoirs* or cupboards for the storage of food, &c., were another kind of furniture of the period of which we are speaking; their tops served as sideboards, and a row of shelves or steps rose at the back for the display of plate, the number of steps "varying according to the rank of the person served." Lights also graced the top at meals, which was then covered with a cloth.

The tables were frames on trestles, sometimes folding, so that on removal, the company could dance and divert themselves. The châteaux of the fourteenth century were well provided with these kinds of furniture. Of the fine timber roofs of this period we need only mention that over Westminster Hall, which was constructed during the close of the fourteenth century.

Mr. Pollen, in comparing the wood sculpture of England, France, and Germany with that of Italy, during the later Mediæval period, gives to the former the merit of being more vigorous, the latter as indicating more grace and repose. Passing on to the Renaissance, to which period of art Mr. Pollen's elaborate descriptions chiefly apply, we may say generally a richer assortment of specimens of cabinetwork and furniture we have rarely seen brought together, and the photographs which this work contains enhance its value as a book of reference for the artist in woodwork no less than the connoisseur. The alphabetical arrangement of this part of the work, by which the several productions are easily found, and the divisions of the subjects into "woodwork for rooms," and also under distinct national headings, increase the value of the book, and make it something of an encyclopædia of the furniture of the Renaissance. We shall here simply refer to a few of the more striking examples brought before us. The Renaissance spread with varying degrees of rapidity. In Italy it made early progress, and may be dated from about the middle of the fifteenth century, if not earlier. The ravages and convulsions of war retarded the progress of social art in England and other European parts, but the churches were spared, and their furniture therefore represents the normal rate of progress in the arts. The best Italian artists engaged themselves in woodwork and furniture of every kind of material and in every variety of art. The museum at Kensington illustrates pretty fully the best Quattro-cento and Cinque-cento specimens. Wood was the staple material, and sculpture the principal decoration. Gilding and painting were considerably resorted to. The Medici family and great art patrons contributed to swell the number of artists and schools of artists who engaged in painting, carving, modelling, and the other accomplishments of art. Of course the old Classic models were followed. The chests *cassoni*, coffers, panellings of ceilings and walls, gilded and painted woodwork, frescoes, tapestries, caskets, mirrors, cabinets, and other furniture, rivalled all preceding examples in the richness and refinement of art. The Italian palaces were hung with tapestries or frescoes; the ceilings were panelled, gilded, and painted, to a profuse degree; the floors were inlaid with marble, brackets of the most beautiful kinds projected from the walls, and every species of art furniture was carried to an excess in ornamentation. The earlier forms, however, were strictly architectonic. Marbles, agate, lapis-lazuli, ivory, mother-of-pearl, and woods of precious kinds, were employed as inlays. We may notice carved chests as a special kind of woodwork, and of which several specimens are in the collection. They took the form of sarcophagi, and, with the tables and chairs, completed the furniture of the Italian halls, were supported on claw-feet with carved panels representing historic or Classical subjects. Masks and sculptured angles and brackets are introduced in various ways, and we advise our readers who feel an interest in coffers and

\* "Ancient and Modern Furniture and Woodwork in the South Kensington Museum Described, with Introduction." By JOHN HUNGERFORD POLLEN. London: Chapman and Hall.



chests to study the Kensington Collection with this book in hand. The bas-reliefs in terracotta and gilt are often marvels of the sculptor's art, and terracotta work and modelling in the wood were common. The smaller chests or caskets were often given to brides, and contained their dowries. Walnut-wood, which is very free and tenacious in grain, was generally used. The same artist doubtless contributed the entire furniture of some of the rooms of this period. Beautiful etchings on the surface of the wood of some of these chests are seen, the ground being cut out and worked over with stars and other kinds of diaper. Cypress was employed for chests to hold dresses, its aromatic properties being valuable, and some of the bridal chests have drawers and receptacles for ornaments of the toilet. No. 4886 '58 in the collection is an example of such a chest. No. 278 '59 shows a gilded-panelled specimen; in other specimens the relieved work is modelled in plaster on the ground, and afterwards gilt. Jacopa della Quercia is the artist to whom some of the earlier kinds are ascribed, as No. 7613 '61.

Of tables we have a choice collection. Nos. 162 '69, 236 '69, are examples. Their tops are covered with Classical subjects; dinner-tables were constructed in pieces and placed on trestles, as already mentioned. Of chairs we may take No. 5682 '59, illustrated in this work, as a very rare example of a sixteenth-century one. The seat is simply fastened into two richly-carved planks cut into elegant forms and carved in massive relief. No. 5682 '59 is especially worthy notice. The back is flanked by grotesque figures of animals, and the middle portion is relieved by elegant scrollwork, and also the summit. The front standard or plank is curved or enriched with side scrolls or caryatides, and rests on grotesque heads. Picture-frames display, in the Cinquecento period, a variety of bold forms and good carving of a conventional kind. Some beautiful-framed mirrors, Nos. 7695 '61 square, and 7694 '61 circular, are typical, and display admirably the carving of this period; the mirror is of polished metal; and these were intended for ladies' use or boudoirs. The "Pietra Dura," a panelling in mosaic or pebbles, is a costly kind of ornamentation brought into use in this century, and was employed in panels, table tops, cabinet fronts, and other furniture. The stones are of the rarest kind, as agate, amethyst, and marbles of all colours, ground and fitted with a nicety, and resembling somewhat the old work called "Alexandrium." Tarsia work was another species of decoration, and was a kind of inlay or mosaic in wood, representing houses and various objects in various shades and colours let into panels of walnut; the pieces, first only black and white, were afterwards stained different colours and tones. Perspective representations were chiefly adopted as being most proper for the material (see Vasari). Choirs of churches and wainscoting were decorated with this species of work. The Venetian territories were distinguished for its production. Specimens of this art are in the collection, and figures and other subjects were executed with it during the Renaissance; No. 5785 '59 may be cited. The earlier attempts of tarsia work were confined to geometrical designs—a far more legitimate use, we think, of such decoration.

We have before remarked one principle which distinguished the furniture of this period—namely, the architectural outline of the designs. Mr. Pollen observes justly that architects and artists did this with the "special object of designing in character," and that the Kensington collection will strike the student with the fact that certain models were in view by the artists of those productions. The triumphal arch we often see thus parodied; so also were tombs and sarcophagi. The Renaissance cabinets fell into this kind of ideal. "A century later they grew into house fronts, showed doors, arches, balustrades, paved floors, looking-glasses, &c.," and we

often see a cabinet turned into a model of an Italian villa.

The discoveries of Roman remains became a field of resource to the artist. Raphael obtained his fine-painted arabesques from the baths of Titus, and the conventional arabesques of the Renaissance became an element which grew into a diversity of rich forms in the hands of the designer. Unfortunately, however, this idea was carried to a great excess, and birds, foliage, and all kinds of crimped work, without an unity or central idea, became, in the later era of the Renaissance, a kind of debased art known as the "Rococo." A central stalk, or some constructive line or purpose, was lost sight of, and the artist fell into license; and a discordant feeling arose utterly repugnant to true art. Mr. Pollen says in the Cinquecento period an architectural character was imparted to furniture "not proper to woodwork for any constructive reasons," and that it was taking furniture out of its obvious forms. This remark is very apropos just now, when there is a tendency to make furniture too architectural, forgetting that the purpose of furniture and the purpose of architecture are not essentially the same. But we must reserve further remarks for another article.

#### THE SOCIAL SCIENCE CONGRESS.

THE Social Science Congress was opened on Wednesday week at Glasgow, under the presidency of the Earl of Rosebery. On Thursday week, in the Health Section, over which Dr. Lyon Playfair, M.P., presided, Dr. Fergusson read a paper "On the Sewage of Towns and the Disposal of Organic Refuse." He condemned the present system of water-carriage as quite contrary to the true principles of sanitary science, seeing that the rainfall and subsoil matter and all kinds of organic and other refuse were indiscriminately bundled into the same sewer and discharged, without any regard to ulterior results, into the nearest stream. He contended that vast numbers of the deaths from diarrhoea, cholera, and typhoid fever were caused by excremental pollution, and he concluded that the only true sanitary solution of the sewage difficulty was that all excreta should either be returned to the earth or subjected to chemical action. If a tithe of the time, and a thousandth part of the money that had been devoted to water-carriage had been spent in investigations in this direction, the problem of the sewage question would have been solved long ago. A paper on the subject was read by Mr. Baldwin Latham, C.E., and was mainly an argument in defence of the water-closet system. He said experience had now shown that neither the earth-closet nor other dry systems could be considered remunerative. By all the dry systems there was a risk of producing or aggravating a certain type of disease. They could not obviate the necessity of the system of drains and sewers, and seeing that water was required, the most should be made of it. No profit but a loss had been incurred by the removal of fecal matter by the dry systems, and he submitted that in point of economy the water-carriage would bear favourable comparison with any other system. A discussion followed, in which the healthiness and economy of the water-closet system was generally upheld.

On Friday, Dr. John Dougall, Glasgow, read a paper on "The Science of Disinfection." He urged (1) that putrefaction of organic matter may be impeded, arrested, or neutralised, or the odour neutralised and masked, and yet the zymotic poison present in all probability remain unaffected, or only be made temporarily dormant; (2) that mineral acids were true disinfectants, and are highly anti-zymotic. Dr. Bond read a paper on the same subject, recommending as the best disinfectant sawdust treated with solution of potassium bichromate, sulphate of copper, and tenebene. No discussion was elicited by the papers.

#### ON PUBLIC HEALTH.

On Monday the business of the Congress was opened by an address from the president of the Health Department, Dr. Lyon Playfair, M.P., "On Public Health." The right hon. gentleman began by stating that he addressed the meeting in the capacity of an old sanitary reformer, having been a member of the Royal Commission on Public Health in 1846, when he published his

report on the state of large towns in Lancashire. The first question was "Were we making distinct and satisfactory progress by our sanitary measures?" If we went back far enough in the history of our country there were distinct assurances of improvement. The mortality in London from 1660 to 1679 was no less than 80 per thousand, and taking the average of the last 34 years the existing death-rate in England was 22·4 per 1,000. The mean age of the whole population during the last two decades up to 1861 and 1871 was exactly the same, and the rate of mortality in these two years was only slightly different. There was a constant disposition to congregate in towns and to leave rural districts. There were now 103 towns in England and Wales containing upwards of 20,000 inhabitants, and these 103 towns contained a larger population than the whole of England and Wales did at the beginning of this century. In every class of district in Scotland the rate of mortality was increasing. From 10 to 30 per cent. of the population of the towns of Scotland consisted of an Irish Celtic element, and their habits had not improved the sanitary condition of the Scotch urban population. The death-rate of London was only 22·4 per 1,000, or the same rate as that of small Scotch towns, and very different from 30·4 the death-rate of Glasgow, or 31·3 the death-rate of Greenock. The difference was not due to climatic severeness, for while 30·4 out of 1,000 died in Glasgow, only 19·4 died in the rural districts of Lanarkshire. Going on to consider the causes which govern life and death, so far as disease was preventable by agencies over which man had control, the right hon. gentleman said that the laws of health, like other laws of nature, were relentless in their severity. Intelligent submission to them produced health and longevity, while the slightest infraction of them was mercilessly punished with disease and shortness of days. For his present purpose he could only refer to some of the more important. The health of a nation, physiologically considered, stood closely in relation to that of an individual whose nutrition and health depended upon the well-adjusted balance of the supply and waste of the particles which compose the body. In the body politic, when the rate of mortality was too high, that was when the individuals of its population wasted too rapidly. Between the physiological condition of a community and an individual the real, the essential conditions in the health of communities and individuals must be the same. They must be well clothed, well fed, well housed, well cared for, and well watered. All that they need aim to secure was purity or cleanliness in the house, the air, and the water, and genuineness in their food and clothes. No epidemic could resist clean houses, clean air, and clean water. The ancients fought against evil smells more vigorously than the moderns, and the purifications required by the religious observances of the Jews were in the main hygienic precautions. Moses established health officers, and before long we may be obliged to enact the ancient laws of Moses for isolating patients with infectious diseases. We isolated them in the case of ships; why not in houses? The isolation of patients affected with smallpox, scarlatina, and measles would one day become a part of hygienic law. In the time of Cardinal Wolsey plague patients were strictly isolated, and during the best times of Greece and Rome public health was much studied. The sum and substance of all our sanitary science might be summed up in the pregnant advice of the prophet: "Wash, and be clean." For his own part he did not mean mere personal or objective ablution, but in the war against uncleanness we must use water as an agent, or disinfectant; or drains, or fire, or any other means of utterly removing and destroying all filth and its consequences. The right hon. gentleman then gave a few illustrations of the consequences attending the neglect of this hygienic maxim. When the civilisation of the Egyptians, the Jews, the Greeks, and the Romans faded the world passed through dark ages of mental and physical barbarism, and then they had the wondrous epidemics of the Middle Ages, which cut off one-fourth of the population of Europe. The natural purifiers on which we relied in combating the pollution of our cities were a free supply of untainted air, unpolluted water, a porous soil, and a healthy vegetation in the squares of our towns to help to purify their atmospheres, and to pour into them life-giving oxygen. It was the want of these conditions which made both town and country dwellings un-



healthy. In modern hygiene nothing was more conclusively established than the fact that vitiated atmospheres in our dwellings and their surroundings were the most fruitful of all sources of disease. Next session the Friendly Societies Bill proposed to deal with some of the many causes of juvenile mortality. He had been much censured because he had dared to show by statistics, gathered on the state of Lancashire in 1846, that the children insured in burial societies died faster than uninsured children; and this had been confirmed by the Friendly Societies Commissioners. He had no doubt that the present Government desired to improve the condition of the people, but there was among their supporters a strong objection to increase local taxation, and without that large measures of improvement could not be carried out. He attached great importance to the reorganisation of our system of local government, which the Conservatives were bound to attempt. In administering the Health Acts there had been a mistrust of the doctors, but the time had arrived when science must be trusted in government. What we wanted in the future was not new law, but more efficient administration of existing law. The sanitary conditions of Scotland were deteriorating, while those of England were improving, and therefore greater care should be bestowed upon the former, but it received none at all. He urged upon the Health section to devote their energies to showing their countrymen how the sacrifice of preventable deaths might be avoided.

Dr. Lyon Playfair afterwards presided over the Health Department, in which the special question for discussion was, "In what way can healthy working dwellings be erected in lieu of those removed for carrying out sanitary or municipal improvements, or for other purposes?" Papers upon the subject were read by Baillie Morrison, the Rev. R. J. Simpson, and Dr. Fletcher. The other questions treated of were infant mortality at Carlisle during the last 20 years; the neglect of infants in large towns; our duty to provide wholesome and pure recreation and amusement for the people, and the dangers which attend our neglect of it; and the hot-air or Turkish baths as affecting the health and social condition of the working classes.

#### POLLUTION OF RIVERS.

On Wednesday, before the Health Section, Major-General H. Y. D. Scott, C.B., read a paper on what should be the extent of immediate legislation to restrain the pollution of rivers. The writer took the position that the question of dealing with river pollution has been made more difficult by the attempt to compel at once a high degree of purity instead of proceeding gradually. He is of opinion that although complete purification can be obtained in practice only by irrigation, or what has been termed the "intermittent downward filtration" system of Dr. Frankland, much can be accomplished by simply removing the suspended matters from sewage before allowing it to flow into rivers, and that to insist upon this being done should be the first step in legislation. Further steps for obtaining a more complete purification might follow, but General Scott believes that the country is not yet prepared for compulsory irrigation, and in proof of this he cites the case of Birmingham, in which irrigation was to be employed after the removal of the solids. In this case almost every man of eminence who could throw any light on the subject was consulted. A singular unanimity prevailed among the advisers as to the course which should be adopted. The plans proposed commended themselves to every unbiassed man who made himself acquainted with the evidence. A Parliamentary Committee patiently investigated all that could be said upon the question, and approved the Bill. If the House of Commons had had the same opportunity of forming an opinion as their Committee, they would probably have concurred in the decision, but an unwillingness to interfere with existing rights prevailed, and the best Sewage Bill ever prepared was thrown out. The country is, in fact, not prepared for compulsory irrigation, even if carried out with all the precautions which science and experience can suggest. General Scott supports his views by the statements of the Royal Commissions on the Sewage of Towns, and by the evidence given on the Birmingham Sewerage Bill:—

"Without going so far as to say that the precipitation by lime is a perfect success, or that it can in all cases be adopted, we feel satisfied that it does to a great extent fulfil the purpose for

which it is employed, so far, at least, as the purification of rivers is concerned. By far the largest amount of nuisance and danger arising from the pollution of rivers by sewage is due to the solid suspended matters, which give off noxious effluvia throughout the period of their decomposition. This is especially the case in our tidal rivers, where these deposits form shoals and cover the banks, and at low water offer a vast surface of offensive matter for the contamination of the air. The lime process does effectually remove this solid suspended matter, and in so far accomplishes a great and manifest good. It also destroys the immediate influence of the noxious gases of sewage, and although it may in the abstract be open to the objection of still leaving matter capable of further putrefaction in the liquid, we are of opinion that, wherever this liquid is thrown into a body of water considerably larger than itself, no evil results will practically be experienced. Our conclusion, then, is that in the absence of the means for the direct application of sewage to land, the methods of precipitation at command do actually offer remedial measures of a satisfactory character."

After adducing evidence to show that methods of precipitation can be carried out without nuisance, the writer proceeded to prove that, even in cases in which the means exist for the direct application of sewage to land, both irrigation and filtration ought, in the generality of cases, to be preceded by precipitation; first, because the removal of the solids will be a nuisance without chemical treatment; secondly, because if the solids are thrown on the land they give rise to offensive emanations; and lastly, because the clarified liquid itself is better suited for irrigation and will require a smaller area to complete its purification than when the solids remain in it. The eminent sewage farmer, Mr. Hope, says:—

"It is because, in my judgment, sewage irrigation cannot be carried out from the utilisation point of view without storage tanks, that it becomes necessary to deal in some way with the sludge, because if you store you cannot avoid deposition. I am prepared to go further, and say that as irrigation with sewage containing the whole of the sludge causes much more smell than irrigation with sewage out of which the whole or a portion of the sludge has been taken, there are many situations where the extraction of the sludge ought to be compulsory, simply because, in a country thickly studded with villas and country houses, I do not think that any man has a right to offend the noses of his neighbours."

Dr. Letheby stated in his evidence on the Birmingham Sewage Bill that "sewage run upon land without being previously defecated by chemicals will be a nuisance wherever it is put on." And being asked—"May I take it, therefore, that you lay it down before the Committee that the proper way of dealing with the sewage would be, in the first place, some chemical process of defecation to separate the suspended matter and some portion of the matters in solution, and then use the land as a filter for further purifying the sewage?" the reply was—"I believe that is the right thing to do." Mr. Hawksley, questioned on the same point replied—"If they ask me what in the abstract I think the right thing, I tell them decidedly that a method of precipitation, or a mixed system of precipitation and filtering, would answer the purpose." The evidence of Drs. Frankland and Odling is then quoted to show that the purification of clarified sewage can be effected on a much smaller area than that of raw sewage, and also that of Dr. Voelcker on the superior agricultural value of the former. Dr. Voelcker states:—

"The chemical precipitation of the sedimentary matter, which is of very little agricultural value, removes the impediment in the application of sewage to the land, which is so great that many farmers, who, I have no doubt would use the clarified liquid, will not use the raw liquid on account of the sedimentary matter which forms a deposit, choking up the pores of the soil, and therefore in a great measure neutralising the fertilising effects which the substances in solution would otherwise produce."

"Here, then," said General Scott, "we have the greatest authorities on the subject—agriculturists, chemists, medical men, and engineers—all concurring in recommending as a preliminary to the ultimate and complete purification by land the very processes which Royal Commissions have declared to 'offer remedial measures of a very satisfactory character.' What possible objections,

then, can town authorities have to offer to the adoption of a precipitation plan, or at all events of a subsidence system, excepting those suggested by fear of increasing the rates? The argument that they do not know the degree of purification which may hereafter be required of them has little weight when it is seen that some method of removing the solids, which cannot be accomplished without depositing tanks, is the first thing to be accomplished in any case. The Government might, without any fear of having to retrace its steps or modify its decisions, confidently make a stand here, and enact that, excepting in heavy thunderstorms, no sewage shall be cast into any river or stream if it contains in suspension more than a certain amount of matter per gallon. Might it not safely go so far as to adopt the decision of the Parliamentary Committee on the Birmingham Sewerage Bill, and enact that, in the vicinity of dwellings, 'no sewage be put upon any land without having been previously defecated in tanks?' To insist on more than this, considering the extent to which the Government is itself implicated in the production of the evils which have accompanied the water-carriage system, would certainly be impolitic and perhaps unjust. A high standard of purity can be attained, in the present state of our knowledge at least, only by irrigation or some modification of it, and suitable land for the purpose cannot always be obtained, or can be obtained and utilised only at a ruinous cost. Moreover, any legislation which aims at too much will merely prove a dead letter. The experience of Birmingham shows how little the public mind is prepared for a comprehensive scheme to be carried out on land purchased by compulsion.

... In conclusion," urged the writer, "let me ask this question:—Since the simple measures recommended by the Royal Commissioners will 'greatly mitigate the existing evils'—(I use their own words)—'practically rid us of the danger and nuisance of town sewage,' may we not reasonably hope that a Ministry which has promised sanitary legislation will listen to an urgent appeal to have these measures enforced? There would be no necessity that legislation should altogether stop at this point. When all the offending towns in the country have been compelled to comply with a low standard of purity, a higher one may be attempted with some chance of success. To insist upon absolute or nearly perfect purity now would end in leaving matters as they are."

#### POPULAR ART IN ENGLAND.

THE following is extracted from Mr. Gladstone's famous article on Ritualism in the last number of the *Contemporary Review*:—

In the inward realms of thought and of imagination, the title of England to stand in the first rank of civilised nations need not be argued, for it is admitted. It would be equally idle to offer any special plea on its behalf in reference to developments purely external. The railway and the telegraph, the factory, the forge, and the mine; the highways beaten upon every ocean; the first place in the trade of the world, where population would give us but the fifth; a commercial marine equalling that of the whole of Continental Europe: these may be left to tell their own tale. When we come to pure Art, we find ourselves beaten by great countries, and even, in one case at least, by small. But it is not of pure Art that I would now speak. It is of that vast and diversified region of human life and action where a distinct purpose of utility is pursued, and where the instrument employed aspires to an outward form of beauty. Here lies the great mass and substance of the *Kunst-leben*—the Art-life, of a people. Its sphere is so large, that nothing except pure thought is of right excluded from it. As in the Italian language scarcely a word can be found which is not musical, so a music of the eye (I borrow the figure from Wordsworth) should pervade all visible production and construction whatever, whether of objects in themselves permanent, or of those where a temporary collocation only of the parts is in view. This state of things was realised, to a great extent, in the Italian life of the Middle Ages. But its grand and normal example is to be sought in ancient Greece, where the spirit of beauty was so profusely poured forth that it seemed to fill the life and action of man as it fills the kingdoms of nature: the one, like the other, was in its way a *Kosmos*. The elements of production, everything embodied under the hand or thought of man, fell spontaneously



into beautiful form, like the glasses in a kaleidoscope. It was the gallant endeavour to give beauty as a matter of course, and in full harmony with purpose, to all that he manufactured and sold, which has made the name of Wedgwood now, and I trust for ever, famous. The Greeks, at least the Attic Greeks, were, so to speak, a nation of Wedgwoods. Most objects, among those which we produce, we calmly and without a sigh surrender to ugliness, as if we were coolly passing our children through the fire of Moloch. But in Athens, as we know from the numberless relics of Greek art and industry in every form, the production of anything ugly would have startled men by its strangeness as much as it would have vexed them by its deformity; and a deviation from the law of taste, the faculty by which beauty is discerned, would have been treated simply as a deviation from the law of nature. One and the same principle, it need hardly be observed, applies to material objects which are produced once for all, and to matters in which, though the parts may subsist before and after, the combination of them is for the moment only. The law that governed the design of an amphora or a lamp, governed also the order of a spectacle, a procession, or a ceremonial. It was not the sacrifice of the inward meaning to the outward show; that method of proceeding was a glorious discovery reserved for the later, and especially for our own, time. Neither was it the sacrifice even of the outward to the inward. The Greek did not find it requisite; Nature had not imposed upon him such a necessity. It was the determination of their meeting-point; the expression of the harmony between the two. It is in regard to the perception and observance of this law that the English, nay, the British people, ought probably to be placed last among the civilised nations of Europe. And if it be so, the first thing is to bring into existence and into activity a real consciousness of the defect. We need not, if it exist, set it down to natural and therefore incurable inaptitude. It is more probably due to the disproportionate application of our given store of faculties in other directions. To a great extent it may be true that for the worship of beauty we have substituted a successful pursuit of comfort. But are the two in conflict? And first of all, is the charge a true one?

To make good imputations of any kind against ourselves is but an invidious office. It would be more agreeable to leave the trial to the impartial reflection and judgment of each man. But one of the features of the case is this, that so few amongst us have taken the pains to form, in such matters, even a habit of observation. And, again, there are certain cases of exception to the general rule. For example, take the instance of our rural habitations. I do not speak of their architecture, nor especially do I speak of our more pretentious dwellings. But the English garden is proverbial for beauty; and the English cottage garden stands almost alone in the world. Except where smoke, stench, and the havoc of manufacturing and mining operations have utterly deformed the blessed face of Nature, the English cottager commonly and spontaneously provides some little pasture for his eye by clothing his home in the beauty of shrubs and flowers. And even where he has been thus violently deprived of his lifelong communion with Nature, or where his lot is cast in huge cities from which he scarcely ever escapes, he still resorts to potted flowers and to the song of caged birds for solace. This love of natural objects, which are scarcely ever without beauty or grace, ought to supply a basis on which to build all that is still wanting. But I turn to another chapter. The ancient ecclesiastical architecture of this country indicates a more copiously diffused love and pursuit of beauty, and a richer faculty for its production, in connection with purpose, than is to be found in the churches of any other part of Christendom. Not that we possess in our cathedrals and greater edifices the most splendid of all examples. But the parish-churches of England are as a whole unrivalled; and it has been the opinion of persons of the widest knowledge, that they might even challenge without fear the united parish-churches of Europe, from their wealth of beauty in all the particulars of their own styles of architecture.

Still, it does not appear that these exceptions impair the force of the general proposition, which is that as a people we are, in the business of combining beauty with utility, singularly uninstructed, unaccomplished, maladroit, unhandy. If instances must be cited, they are not far to

seek. Consider the unrivalled ugliness of our towns in general, or put Englishmen to march in a procession, and see how, instead of feeling instinctively the music and sympathy of motion, they will loll, and stroll, and straggle; it never occurs to them that there is beauty or solemnity in ordered movement, and that the instruction required is only that simple instruction which, without speech, Nature should herself supply to her pupils.

*Quid fecerent, ipsi nullo didicere magistro.*

Take again—sad as it is to strike for once at the softer portion of the species—the dress of Englishwomen, which, apart from rank and special gift or training or opportunity, is reputed to be the worst in the European world, and the most wanting alike in character and in adaptation. Take the degraded state, in point of beauty, at which all the arts of design, and all industrial production, had arrived among us some fifty years ago, in the iron age of George IV., and before the reaction which has redeemed many of them from disgrace, and raised some to real excellence.

But, indeed, in too many cases, our repentance is almost worse than our transgressions. When we begin to imbibe the conception that, after all, there is no reason why attempts should not be made to associate beauty with usefulness, the manner of our attempts is too frequently open to the severest criticism. The so-called beauty is administered in portentous doses of ornamentation sometimes running to actual deformity. Quantity is the measure, not quality, nor proportion. Who shall now compete with the awakened Englishwoman for the house of hair built upon her head, or for the measureless extension of her dragging train? Who shall be the rival of some English architects plastering their work with an infinity of pretentious detail in order to screen from attention inharmonious dimension and poverty of lines? Or that I may without disguise direct the charge against the mind and spirit of the nation, embodied in its Parliament and its Government—what age or country can match the practical solecisms exhibited in the following facts and others like them? Forty years ago we determined to erect the most extensive building of Pointed architecture in the world; namely, our Houses of Parliament, or, as they are called, the Palace of Westminster. We intrusted the work to our most eminent Italian architect. Once was pretty well; but once was not enough. So, twenty years ago, we determined to erect another vast building in the Italian style, namely, a pile of public offices, or as some would call it, a Palace of Administration; and we committed the erection of it to our most experienced and famous architect in the Pointed species. Thus each man was selected for his unacquaintance with the genius of the method in which he was to work. Who can wonder, in circumstances like these, that the spirit and soul of style are so often forgotten in its letter; that beauty itself unlearns itself, and degenerates into mere display; that for the attainment of a given end, not economy of means, but profusion of means, becomes our law and our boast; that, in the Houses of Parliament, dispersion of the essential parts over the widest possible space marks a building where the closest concentration should have been the rule; and that the Foreign Office, which is a workshop, exhibits a staircase which no palace of the Sovereign can match in its dimensions?

#### A REMARKABLE RAILWAY BRIDGE.

FROM the early settlement of the Western country, and especially since the introduction of railways as a means of transit, one of the most important problems presenting itself for solution has been how best to secure the safe and rapid passage of the Mississippi river by trains, &c., without obstructing its navigation. Rafts have been the greatest cause of anxiety to bridge builders, for they are commonly 320ft. in width, so that no ordinary drawbridge could be constructed to permit them to pass unbroken. The river men have strenuously opposed the construction of piers in the channel. Notwithstanding this, they have been constructed at various points, and are notoriously an obstruction to navigation. Aside from this, the cost of ordinary bridges is so great, that few corporations could be found willing to risk such an outlay, even if the money could be obtained. Various schemes for transferring the cars across the river have been tried and

proved failures. The only one which has worked with any degree of success is the transfer steamer, which is at best a clumsy, slow, and expensive method. To overcome this difficulty has been the work and study of many eminent engineers, but it has remained for a practical man, experienced in the peculiar requirements of the case, to solve the problem and construct a bridge which, for its simplicity, security, and adaptation, is unsurpassed. It required no small amount of courage to risk 100,000 dollars in an experiment which was almost universally considered a visionary scheme. The Mississippi river between Prairie du Chien, Wis., and North McGregor, Iowa, is divided into two branches by an island. The Eastern—or Prairie du Chien—channel is solely used by the large steamers of the different packet lines; the Western—or North McGregor—Channel is exclusively the waterway chosen by rafts. These towns are the terminal points of the Milwaukee and St. Paul Railroad on the Mississippi river, and the object of the bridge was to connect them. The bridge is constructed on piles driven into the bed of the river, over which rests a single railroad track. The length of the bridge measured upon this track is 7,200ft. from one shore to the other. There are two pontoon draws. The one over the eastern channel consists of three pontoons, connected lengthwise firmly, and representing a distance of 396ft. These pontoons are each 28ft. beam, 5ft. height of side, and 10in draught of water. The draw over the western channel consists of but one pontoon, 408ft. long, breadth of 28ft., height of 4½ft., and draught of 11in. When trains are passing over, the draught of both draws increases to about 18in. The varying height of the planes between the pile bridge and the pontoons is overcome by aprons, or movable tracks, which are adjusted by means of powerful screws and movable blocks, operated by the men who are stationed on the pontoons for other purposes, thereby involving no extra labour or expense. The connections between the ends of these aprons and the track on the bridge is a simple device, counter-balanced by equal weights, so that one man clamps and unclamps the end of the pontoon when swung into or out of position. The closing and opening of each draw is effected by a small engine of 20 horse-power, working a simple winch, round which is wound a chain. The extremities of this chain are secured to clusters of piles above and below the draws, so situated as to give it a diagonal lead across the river. The draw opens with the current in one minute and closes against it in three minutes, without showing any undue strain or requiring the application of more than one-fourth the power of the engine. The direction of the current strikes the eastern draw at an angle of 75deg. 30min., and the western at an angle of 55deg., thus leaving a clear space of 383ft. for the former channel and 334ft. for the latter, besides permitting the surface current to flow past the pontoons without expending its full force on them. In relation to the navigation of the river, the captains and pilots freely and frequently assert that this bridge is the easiest to pass of any on the river, and consider it no obstruction whatever to navigation. The most influential river men, and those most deeply interested in hindering its obstruction, thus express themselves in a paper presented to the builder:—"We are of the opinion that this bridge is an improvement over the bridges now being built over the Mississippi river, and less dangerous to navigation, whether by boats or rafts." General Humphreys, chief of engineers, United States Army, in his report to Congress, refers to this bridge in the following words:—"While the bridge in question is exceptionally free from objection as an obstruction to navigation, it conforms to existing laws regulating the bridging of the Mississippi river in that it affords excellent facilities for steamers and rafts to pass through the draw opening." In relation to the passage of trains, it is proved to afford greater security than ordinary drawbridges, for the pontoon is capable of floating a weight six times greater than that of the heaviest trains, and there is no danger of accident from the breaking of overstrained spans. It affords facilities for the passage of 1,000 cars a day, the average number being now about 300. The cost of the entire structure and its appurtenances is one-sixth of that of the most inexpensive bridge across the river, and one-fifteenth of the lowest estimates for constructing an iron drawbridge at this point. The expense of operating it is far below that of operating any drawbridge across this river. The



time required for its construction is not over ninety days, and very much less at points where material and labour are abundant. To these great advantages add that of an immense reduction of the tolls and expense of crossing the river below that which is charged by other bridge companies, and it is readily understood how great and lasting a benefit has been conferred on commerce and navigation by the designer and builder.—*New York Herald.*

#### SWEDISH FOREST CULTURE.

THE Swedes are now paying great attention to the proper management of their forests. In 1868, the King appointed a special commission to inquire into the need of further legislation in relation to forests, and to report a bill for a law on the subject. Their report was submitted in December, 1870, and, with the bill accompanying it, makes 392 printed pages, besides numerous tables. One clause in the reported bill is the compulsory feature now in force in all of the countries of Europe that have given much attention to forest administration; namely, that owners of private forests shall not, under a penalty of from 5 to 500 rix dollars, cut therefrom, and dispose for commercial purposes, trees that are less than 8 ft. 3 in. in diameter, at a distance of 16 Swedish feet from the large end, or less than 11 in. in diameter at the small end. The Minister Resident of the United States in Sweden and Norway thus reports to the Hon. Hamilton Fisk, on the Forests and Forest Culture of Sweden:—"In 1850, the then chief director of the Forest Institute estimated the area of land in Sweden which bears, or is suitable for bearing forest, at 30 million acres, which agrees with the estimate of other authorities; and he expressed the opinion that if forest growing was properly attended to, the country would not only have enough product therefrom for its own use, but a quantity for export, which at the then increased price of timber in southern countries, would be more profitable than the export of iron."

Mr. Forsell, in a paper on this subject, published in 1844, shows that a lack of timber was beginning to be felt in many parts of Sweden, and states that Stora, Kopparberg, and Gefleborg were the only counties so rich in forests as to be sure of their preservation for a long term of years without an improved system of forest economy. And, he adds, that if such a system shall not be established, the whole country will soon suffer for the want of forests. As proof, however, of the efforts in this regard, which were being adopted by the Forest Institute, as well as the Iron Office, it may be mentioned that on Wisingo Island, 700 acres were planted with oaks; the sand-plains of Christianstad and Holland counties were planted with trees, and improvements were made in the royal parks. The annual growth, or production of forest, may be calculated, says Thomée, at 22 famns (a Swedish "famn" is little less than a cord), of 100 cubic feet Swedish, per tunnland—say 20 cords per acre, a tunnland being equal to 1·22 acres—estimating the time of re-growth at 100 years, usual in the south and middle parts of Sweden, so that 300,000 acres growth out of the 30 million acres are consumed annually, and the annual product, according to the present resources of the forest, is 6,000,000 cords. The consumption of forest is calculated by Forsell at 7,230,000 famns yearly, including the export of boards and heavy timber. Ström estimates it at 7,775,200 famns. Lundberg, again, considering the increase of the population for the present, at least 8,865,200 famns. Supposing the production to amount to 5,700,000 famns, there occurs, says Thomée, a yearly lack of 3,165,000 famns, which should be supplied in a way not to draw on the forest for more than it can yield. According to the opinion of experts, if cultivation is properly attended to, the Swedish forests can supply that need and a considerable surplus. At present one sees along the principal routes of travel a generous supply of forest, though the trees are mostly young, and the surface of the country being agreeably undulating and abundantly supplied with clear streams and lakes, tends to produce a favourable impression. The growth of young forest on patches too rocky for tilling or even grazing, and the scattered seed-trees left standing in places where wood or timber has been cut off in the larger forests, remind the traveller of the attention to forest culture which is becoming general. The export of all sorts of timber and wood from Sweden in 1870 amounted to

109,000,000 cubic feet, besides 14,000,000 sticks of wood and other timber. The total area of forest land under the care of the Administration of Forests is 5,000,000 acres. The Bureau of Forest Administration, created in 1859, is a most valuable institution, which gives the most minute practical instruction in the art of tree culture. In 1869 his Majesty issued instructions for the forest administration and the forest corps, and laid down the duties of the director and his subordinates, and from time to time other instructions have been issued which show a thorough knowledge of the timber resources of the country, and the best manner of turning them to good account. For instance, advances from the public funds are made to survey forests not belonging to the crown, the advances to be paid back from the yield of the surveyed forest. The manner of working a forest is lucidly set forth, and regulations laid down for the due instruction of pupils. These are taught surveying, estimation of areas and cubic contents, construction of maps, valuation of soil, growing and felled timber, practical measuring, &c.; also the use of firearms, the theory and technical terms of the chase, the construction of wolf-pits, traps, nets, and cages, and, in short, all the mysteries of woodcraft. With such a thorough scheme in operation, there can be no doubt of the consequences of former mal-administration being averted, and that Swedish wood will long bring a most important addition to the revenues of the country.

#### AN HYDRAULIC CAR BRAKE.

AN American invention of some value has been brought out. It is a brake on hydraulic principles, the invention of Mr. Henderson, and is particularly applicable to railroad purposes. The peculiarity of the invention we will here point out. A cylindrical vessel of cast iron, having ends of flexible hollow diaphragms of indiarubber, is placed between the wheels of each truck. These diaphragms have flanged airtight joints. Within these diaphragms, and working in opposite directions, are two rams, their outer ends attached to the brake beams carrying the brake shoes. Steam pressure introduced between the diaphragms forces them apart, and, acting upon the rams or pistons, also brings the brakes into operation. The pressure being relieved, the atmospheric reaction again comes into play and forces the rams back, and this effort is assisted by the elasticity of the diaphragms themselves. A cylinder and working piston, recoil springs, stuffing-boxes, lubrication, and all complicated contrivances, are dispensed with. There are no levers, rods, or other parts likely to become deranged. When the pressure is applied the brakes are applied by the outward-acting ram, and the same pressure that impels the locomotive is used to stop it, the power being direct from the boiler. The principle, it will be seen, is that of an hydraulic press, and the transmitting power consists also of an hydraulic press operated by a double-acting cylinder, the valve worked by the engineer's hand. There is a piston in each, one acting to force the water from the other, thus creating hydraulic pressure on the brake cylinders, and to withdraw it. A special water-tank, or the engine-tank, supplies the water to the press, and the supply feeds automatically. For low temperatures a mixture of glycerine and water is used in equal parts.

The advantages claimed for this brake are the following:—

1. Absence of all complicated pumping machinery.
2. Dispenses with the use of cylinders under the cars, with their pistons, packing, recoil springs, levers, rods, &c.
3. No lubrication required, and no parts affected by dust.
4. No preparation required, the boiler being the reservoir of power.
5. Brakes are applied by boiler-pressure and released by atmospheric pressure, and no interference with working of the hand-brakes.
6. Its simplicity.
7. Its economy, steam being used only at the moment of applying the brakes.
8. Its cheapness.

We are informed this brake has been in constant use on the West Chester and Philadelphia Railroad, and has been successfully worked. When brake-shoes are on the outside of the wheels one of the diaphragms and rams is obviated, and the casting is bolted directly to the outside of one of the brake beams. When pres-

sure is applied the action and reaction are equal. The casting presses one way and applies the brakes, the opposite brakes being drawn on by means of rods attached to the head of ram, and connected with the other brake beam.

#### SAGGAR-MAKING BY MACHINERY.

THE *Staffordshire Advertiser* gives the following account of the adoption, at the works of Messrs. Minton, Stoke-upon-Trent, of a machine which has recently been introduced by the senior partner, Mr. C. Minton Campbell, M.P., for the manufacture of saggars. It seems that a few months since Mr. Campbell chanced to take refuge from a storm in a shop at Aberdeen, and there saw a machine used for rolling out dough to be converted into biscuits. The idea struck him that the principle of this machine might be utilised for the production of the large flat pieces of marl required for the making of saggars. He accordingly ordered one of the biscuit-making machines to be put up at the manufactory, and, after numerous experiments, was enabled to give instructions to Mr. Kirk, of Etruria, for the erection of a much larger machine embodying the alterations which had been found necessary. After the machine had been made several new difficulties arose, but Mr. Campbell, assisted by Mr. G. Leason, one of his managers, persevered, and in the end has brought the machine to something like perfection. Its leading principles are not very complicated, however difficult the mastery of some of the details may have been. A travelling carriage passes backwards and forwards under a series of rollers; on this carriage are placed three loose trays of the length, depth, and width of the side of the saggar. The marl is placed in lumps on one end of these trays, which are carried backwards and forwards under the rollers three or four times. They are then carried to the saggar-maker, who, the trays having strips of loose leather at the bottom, takes out each side without difficulty. The bottoms of the saggars are made in a similar manner, as are also kiln bats and other articles of that kind. Experience shows, as might be expected, that the uniform pressure exercised by the rollers turns out a slice of marl of much more uniform thickness and consistency than is possible under the usual and rude method of beating out the marl by hand with a flat-headed mallet. The consequence is that the saggars made by the machine are in every respect stronger and better than those made by hand. It is too soon at present to speak of the comparative cost of the new and the old processes, but it is fully believed that the saving will prove to be considerable. One important advantage has been established, and that is that it is no longer necessary to weather or grind the marl. It has been customary with Messrs. Minton to keep some 2,000 tons of marl in order that they may have a weathered stock, but they now find a stock of 300 or 400 tons sufficient. There is also a saving of one-half the usual quantity of "grog" (old saggars pounded up, and the fragments mixed with marl). The machine is not patented, and Mr. Campbell wishes it to be known that his brother manufacturers are quite at liberty to call and see it at work.

#### COMPETITIONS.

LEICESTER MUSEUM EXTENSION.—At the last meeting of the Leicester Town Council, the Museum Extension Committee presented a report recommending the plans submitted by Messrs. Shenton and Baker and Mr. Hames as the two best designs for the new Lecture Hall and School of Art in connection with the Museum. The reports of the President of the Literary and Philosophical Society and the head-master of the School of Art were also read, and were in favour of the plan of Messrs. Shenton and Baker. After some discussion, in the course of which it was stated that none of the competitors had thoroughly complied with the conditions and instructions, it was resolved that Messrs. Shenton and Baker's design receive the first premium, and that the same be carried out, subject to a suitable tender being obtained for the execution of the work for the stipulated sum of £5,300. Mr. Hames was awarded the second premium of £20. Five sets of drawings were sent in.

THE COMPETITION AT HASTINGS.—A special meeting of the Town Council was held at Hastings on Wednesday evening, in order to



decide which of the thirty-four designs for the new Town Hall should be accepted. One of the plans having come in too late, it has been decided to disqualify its sender from the competition. There was a full meeting of the members. In the course of a long discussion, two opposing sentiments were made known. One view, held strongly by some members, was that all the plans which did not state the same could be carried out for the £10,000 specified in the conditions should be rejected. The majority, however, were of opinion this would not be just towards those who had candidly said the cost must be over the mark. Mr. Councillor Hill (an architect) declared that only two or three of the inferior plans could be carried out for anything like £10,000. He moved that, to act in perfect accordance with justice to the competitors, the Council should call in professional assistance to calculate at what price each plan could be carried out. Mr. Alderman Howell (who had previously urged that, if the cost was found to be excessive, the Council should abandon the idea of building altogether) stated that, in cubing the buildings, no one could vary much more than one penny a foot. He mentioned Trinity Church and the Music Hall as having been built at a cost not exceeding 4d. a foot. Mr. Hill said some had honestly acknowledged that the buildings could not be put up for less than £15,000. His motion, to engage professional assistance, was carried by 2 to 1 against the amendment to reject those who had not stated that their plans could be carried out for £10,000. It was afterwards unanimously agreed to secure the services of Mr. Card, surveyor to the county authorities of Sussex, to decide on the relative cost of each plan.

**THE MARGATE DRAINAGE COMPETITION.**—At a special meeting of the Town Council, held on Tuesday week, there was another long and rather warm discussion upon the various plans. The usual divergence of opinion was shown, and the Surveyor expressed a decided opinion against the practicability of the schemes to which Sir Joseph Bazalgette accorded the preference. It was ultimately resolved, by 11 to 4, to eliminate from the competition all the plans except those of "C. E." and "Economy," the two recommended by Sir Joseph Bazalgette. The following resolution was afterwards carried by 8 to 7:—"That the authors of 'Economy' and 'C. E.' be communicated with to ascertain if they will make such alterations in their plans as will meet the requirements of and enable them to pass the Local Government Board, in accordance with rule 7 of the conditions and with Sir Joseph Bazalgette's report." On Tuesday last, on the motion of Alderman Knight, the first prize of £200 was awarded to "Economy" (Mr. L. Angell), subject to certain conditions agreed to by the competitor. It was then proposed by Mr. Councillor Sear to award the second prize of £100 to "C. E." (Gotto and Beesley), but the motion was almost unanimously refused.

#### CHIPS.

Mary Queen of Scots' prison, at Sheffield, is now restored and open to the public. The building was used as a farmhouse, and it was only lately that some workmen discovered behind some stucco a doorway and spiral staircase which led to a guard room and kitchen on the ground-floor, and above a large apartment used by the unfortunate queen as a state room.

It is in contemplation to extend the Kelvingrove Museum, Glasgow, by adding to it a large central block with two wings, at a cost of about £40,000. The nucleus of an antiquarian collection has been given by Mr. Sheriff, of Abbotshauigh.

The spire of Strasburg Cathedral, hitherto reputed to be the highest in Europe, is now said to be surpassed by the spire of the new Church of St. Nicholas, Hamburg, the total height of which, to the top of the cross, is reported to be 472ft., or 6ft. higher than Strasburg.

In the last number of the *Philosophical Magazine* there is a note by Mr. C. Horner, stating that certain colouring substances derived from wood which do not exhibit fluorescence when dissolved in water or alcohol, become highly fluorescent when immersed in castor-oil. Turmeric in castor-oil gives an emerald-green fluorescent light at least three times as vivid as that obtained when it is immersed in other fluids.

A new Primitive Methodist Chapel was opened at Driffield, on Friday last. It, and a new schoolroom which adjoins it, have been built from designs by Mr. J. Wright, of Hull, architect. The chapel is capable of holding 1,000 persons. The schoolroom on the ground-floor will accommodate 600 children, and 120 infants, for which there is a separate room, the buildings will cost nearly £5,000.

## Building Intelligence.

### CHURCHES AND CHAPELS.

**BATTERSEA.**—St. Mark's Church, Battersea, was consecrated last week by the Bishop of Winchester. The church, which affords sittings for 600 persons, has been built from a design by Mr. William White, F.S.A., in the Geometrical or Middle Pointed style. Simple materials are used, but there are some notable features in the design. The chief feature is the apsidal chancel, round which there is an ambulatory descending by a flight of steps on either side to a vaulted crypt, the ambulatory being separated from the sacra-rium by an exceedingly good open arcade in brickwork. One peculiarity of the construction is that the walls of the church throughout are of concrete, faced inside and out with bricks. The columns supporting the nave arcade are of grey Pennant stone, with Bath stone caps. Three of the windows in the apse are filled with stained glass by Lavers, Barrand, and Westlake. The chancel is paved with subject-tiles, drawn by Mr. Clayton. The work of erecting the church has been done by Mr. Gregory, builder, of the Clapham Junction Works, at a total cost of £6,500.

**CLACTON-ON-SEA.**—The foundation-stone of a new church was laid at Clacton-on-Sea on Friday last. The plans have been prepared by Mr. G. Gard Pye, A.R.I.B.A., of Colchester. The style chosen is Early English Gothic, and the building will consist of a semi-octagonal chancel, nave, two side aisles, tower, vestry, &c., and will seat 350 persons. The edifice is to be built of concrete, formed of the shingle from the beach, and by utilising this material of the district the contractors have been enabled to take the contract at the sum of £883. The exterior face will be relieved with shingle dashing, while all the mouldings, caps of buttresses, string-courses, &c., will be formed in cement. The builders are Messrs. Saunders and Son, of Dedham.

**EAST DEREHAM.**—The new Congregational Church at East Dereham, erected as a memorial to the poet Cowper, has been opened. It is in the Gothic style of architecture, will hold about 500 persons, and its total cost, including lighting, &c., will be about £3,500, of which between £1,200 and £1,300 has yet to be paid. Mr. E. Boardman, of Norwich, is the architect. A monument is being fashioned by Messrs. O. and A. Davidson, of the Granite Works, Inverness (the firm which made the pulpit), to perpetuate the fact that on the spot William Cowper resided. The monument will be of red granite, 9ft. high, Gothic in design. It will bear an inscription written by the Dean of Westminster.

**EDINBURGH.**—The reopening of St. Mary's Church and the Morningside United Presbyterian Church, Edinburgh, both of which have recently undergone considerable alterations, took place on Sunday. In the former the antiquated box of the perceptor has been removed, and in its stead a platform for the choir erected. The pulpit has been slightly lowered, while other portions of the building have also been improved, under the direction of Mr. Lessels, architect—the expense connected with the alterations being upwards of £600. The members of the Morningside United Presbyterian Church recently agreed to fit up a gallery, capable of holding about two hundred persons, at the west end of the church. The heating apparatus of the building has been improved, and at the east end there is being added a hall, to be seated for about 110 persons. The whole of these works were contracted for by Mr. Black, builder, Dalry, and superintended by Mr. Paterson, architect, and will cost about £700.

**HOPE.**—On Saturday afternoon St. James's Church, Hope, was reopened, after undergoing partial restoration. The church was built in 1861, at an expenditure of £6,200, exclusive of the cost of the tower and spire, which were subsequently added. It was a handsome edifice with sitting accommodation for 630 persons. The foundations were laid upon the red sandstone, and the pillars supporting the nave had each a separate base of brickwork, headed with stone. The bases of the pillars were not made sufficiently solid, and in the course of time the pressure of the superstructure upon the columns pulverised the brick foundations, and the pillars

gradually sank, lowering the roof of the church. The work of restoring the church to its original elevation has cost upwards of £1,200. The roof had to be screwed up and supported by immense beams, and the sunken columns had in like manner to be raised while their basements were firmly laid upon the rock. The upper walls of the nave were also lightened by the removal of several heavy buttresses, which neither gave strength nor beauty to the building, but added considerably to the weight of the superstructure. Mr. J. S. Crowther was the architect, and Messrs. Robert Neill and Son were the builders to whom the restoration was intrusted. The Bishop of Manchester at the opening service said it seemed to teach them the delusiveness of an ill-constructed or "scamped" work. A few days ago at the laying of a foundation-stone of a new church, he took occasion to express the hope that the contracts had been let to and accepted by a responsible and conscientious contractor, and he said that he had a reason for saying so, inasmuch as the very day before he had been informed of a church which had been built at a cost of something like £13,000, and which was to accommodate 650 persons, the roof of which had been covered with tiles of such imperfect manufacture that on wet days pails were placed in certain parts of the church to catch the water which came through the ceiling, and it was felt it would be necessary before long to strip the roof, at an estimated cost of more than £500.

**NUTHLEY, YORKSHIRE.**—The foundation-stone of a New Chancel to the interesting parish-church, of Nuthley, Yorkshire, was laid on the 29th ult. by the Hon. and Rev. P. Y. Savile, M.A., Rector. The nave and aisle have been already restored, but the dangerous condition of the chancel walls has rendered it necessary to rebuild this portion, with which will be included new vestries for clergy and choir, and a chamber for the organ—a fine instrument by Gray and Davison. The large east window will be filled with stained glass, the subject being the Ascension; this is being executed by Mr. Charles A. Gibbs, of 148, Marylebone-road. The architect engaged is Mr. Hugh R. Gough, of London, and the whole of the work is being admirably carried out by the contractor, Mr. John Lister, of Aston, near Rotherham.

### BUILDINGS.

**COVENT GARDEN MARKET.**—At length the work of roofing over the south quadrangle of Covent Garden Market has been commenced. The loftiest of the three experimental sections of roof have been adopted as the type, and the columns for six bays are fixed, besides the clerestory window-frames. The columns are about 12ft. apart, and are connected by light iron arcading, just below the eaves of the market buildings on each side of the quadrangle. Above each of these arcades, and between each of the springing-posts of the roof principals, will be two-light clerestory windows, giving a large quantity of light to the market area, although they will be supplemented, we believe, by a continuous skylight let into the roof on each side, about midway between the apex and the eaves. In order to interfere as little as possible with the business of the market, no fixed scaffolding is erected, a very strong and well framed travelling timber staging being used.

**SHIPTON BEAUCHAMP.**—A new parsonage has been built here. It has been designed with a view to providing facilities for holding choir meetings, adult classes, &c.; a passage, to which there is an external entrance, gives access to the prayer-room and study, and these, by an arrangement of double doors, can be thrown together. It is built of native stone walling, with Ham Hill stone dressings; the roof is covered with Bridgwater tiles. The work has been carried out by Mr. Davis, of Langport, from the designs of Mr. R. W. Drew, of Queen Anne's Gate, Westminster.

**SOUTHPORT.**—On Tuesday the new Cambridge Hall at Southport was opened. The building has cost £40,000. Its dimensions are 131ft. from end to end, and 86ft. from front to back. The principal entrance, in the centre of the Lord-street front, is protected by an arcade extending between a tower at one end and a projecting pavilion at the other, and by a projecting carriage-porch, with stone pillars. The entrance-hall is the largest apartment on the ground-floor, its length, inclusive of staircase, being 53ft., and its width 35ft. It is divided into bays by three



arcades of pillars. On the right-hand side of the hall is the mayor's reception-room, 36ft. by 25ft. The approach to the principal floor is by a flight of stone stairs 11ft. wide. This staircase leads to a corridor 86ft. long. Parallel with this corridor and communicating with it by three large doorways is the assembly-room, 120ft. by 50ft., with a large orchestra platform at the Town Hall end, and galleries on three sides. The whole of the ground-floor on the left of the entrance-hall is let to the Postmaster-General as a postal and telegraph-office. The height of the tower is 127ft. The four figures in the sides of the tower from the chisel of Mr. Alfred Norbury, of Liverpool, and represent Caractacus, Julius Caesar, Edward the Confessor, and Alfred. The architects of the whole were Messrs. Maxwell and Tuke, of Bury, and the builders Messrs. Heyward, of Southport.

## SCHOOLS.

**FARNHAM.**—New Roman Catholic schools are now in course of erection at Cambridge Town, Farnham. Mr. E. W. Pugin is the architect, and the builders are Messrs. Spooner and Bullem, of Bagshot, the cost being £600.

**LIVERPOOL.**—The new schools erected by the Liverpool School Board in Chatsworth-street, Liverpool, were opened on Monday. They will accommodate 1,000 children, divided into 400 infants, 360 junior, and 240 senior scholars. The angle of the building is carried up as a gable tower, and in this are the bell and a cast-iron tank holding 3,750 gallons, supplying the building by a 3in. cast-iron main supply, fitted with hydrant and hose in case of fire. Each main façade is faced with Lancashire shoddies with Woolton stone dressings. The whole of the joiners' work is pitch-pine. The sole contractors were Messrs. Burroughs and Son, of Leicester-street, Liverpool. Mr. T. Mellard Reade, C.E., was the architect.

**LONDON.**—We stated last week that the London School Board has now in course of erection 35 schools, to accommodate 26,736 children, in addition to 65 schools (accommodating 61,987 children) already opened, and 34 schools (to accommodate 24,000 children) about to be commenced. The following is a nearly complete list of the schools now in hand, together with the contractors' names, and the amounts of contracts: Penton Grove, Mr. J. Grover, £5,295; Rolls-road, Mr. B. E. Nightingale, £9,895; Tower-street, Mr. J. High, £8,775; New Castle-street, Mr. J. H. McColla, £5,428. 15s. 10d.; Albany-row, Mr. G. Stephenson, £6,394; Gloucester-road, Messrs. Hill, Higgs, and Hill, £10,240; Russel-street, Mr. W. Howard, £6,063. 13s. 9d.; Haverstock-hill, Mr. G. Wall, £9,269; Johanna-street, Mr. B. E. Nightingale, £7,488. 10s. 8d.; Canterbury-road, Messrs. Longden and Co., £8,081. 15s. 3d.; New North-street, Mr. T. Ennor, £6,200; Penrose-street, Mr. J. Cooper, £7,544; Vauxhall-street, Mr. J. Tyerman, £5,560. 13s. 9d.; Blackheath-road, Mr. S. J. Jerrard, £7,283; Wainut-tree-walk, Mr. S. J. Jerrard, £6,049; Central-street, Mr. G. S. Pritchard, £6,526. 8s. 10d.; Bowling-green-lane, Mr. G. S. Pritchard, £6,261; Camden-street, Mr. R. Mann, £8,743; Monte-Video place, Mr. R. Mann, £5,943; Upper Earl-street, Messrs. Kirk and Co., £6,935; Richard-street, Messrs. Kirk and Co., £5,901. 12s. 1d.; Borough-road, Messrs. Kirk and Co., £7,571. 5s. 1d.; Cayley-street, Messrs. Kirk and Co., £5,279; Lewisham-bridge, Messrs. Kirk and Co., £1,738; Shap-street, Mr. J. D. Hobson, £7,980; Duke-street, Mr. J. D. Hobson, £5,589; Stanhope-street, Messrs. Scrivener and White, £6,965. 1s. 6d.; Saxon-street, Messrs. Cooke and Green, £7,622. 9s.; Marlborough-street, Messrs. Cooke and Green, £7,078. 8s. 6d.; Cottage-row, Mr. R. Mann, £9,010. 16s. 8d.

On Wednesday the Duke of Edinburgh laid the foundation-stone of a new wing of the Royal British Female Orphan Asylum at Devonport. The building was erected in 1845. In 1873 the Board of Admiralty set apart £4,000 a year for the maintenance and education of 260 girls of deceased seamen, and the Royal British Female Orphan Asylum was requested to provide for 50 of these girls. This arrangement rendered increased accommodation necessary, and, at a cost of 5,000, two wings have been added to the building.

The Chaplain of the Savoy has presented to the Chancellor of the Duchy of Lancaster a memorial from the inhabitants of the royal precinct of the Savoy upon the subject of a new approach to the Thames Embankment from the Strand. The memorialists submitted a plan for an approach in a direction through Savoy-street.

## TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces. All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

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**RECEIVED.**—H. P.—J. C.—M'Tear & Co.—W. S.—H. B.—F. M. and Co.—M. Bros. and Co.—L. and N.—S. R.—J. R.W.—E. O. T.—Mc. F. and Co.—W. W.—J. T. & Son—S. H.—J. J. C. and Co.

R. T. S. (We cannot say, without seeing it, whether your carved chimney-piece is suitable for illustration in our pages or not).—WM. JONES (We gave in preceding volumes abstract reports of forty lectures delivered by Dr. Zerffi at South Kensington).—DUNN & HARRISON (To hand, and sent to the lithographers).

## Correspondence.

## MARGATE DRAINAGE COMPETITION.—THE SECOND PRIZE.

(To the Editor of the BUILDING NEWS.)

SIR,—What is customary and what is right in the present aspect of the Margate Drainage Competition? The case stands thus:—

Eight out of ten chosen engineers, who were all "men of mark," competed. Two premiums of £200 and £100 respectively were offered. Sir J. Bazalgette was called in to advise. On the 29th ult. the Council of the Borough resolved that "all the plans but those of 'C. E.' (Messrs. Gotto and Beesley) and 'Economy' (Mr. Lewis Angell) should be eliminated from the competition." On Tuesday, the 6th inst. Ald. Knight carried his motion, "That the first place be awarded to Economy (Mr. L. Angell), subject to certain conditions which Mr. Angell had agreed to by letter." But on the motion of Mr. Councillor Sear, that the second premium be awarded to "C. E." (Messrs. Gotto and Beesley), the Council refused almost unanimously to accept the motion, and it was lost by a large majority. Now, Sir, J. Bazalgette had been only adviser, but not referee, and he recommended "Economy" as first, and "C. E." as second. The Council adopt the first half of the recommendation, but throw out the second. They moreover "eliminate" all but two of the competing plans, and then refuse the award of the second premium entirely. In this case, what comes of the second premium? The Borough Surveyor (Mr. A. Latham) stated to the Council that the plan of "C. E." was not of any use whatever to the town, nor could it be altered or modified in any way to make it of any use, or at all applicable to the end in view; and this unfavourable report may have had its influence in causing the Council to refuse the payment of the second premium. But is this a sufficient ground, under the circumstances stated, to warrant its being withheld?—I am, Sir, &c., S.

## THE PERSPECTIVE OF WATER STAINS.

SIR,—Every means of artistically representing form and character is so important to the architectural draughtsman that I would ask leave to notice the commendable attention to water stains in the roofs of Mr. Walker's chapel, illustrated on the 2nd inst. The mode of projecting the upright joints of the pyramid, in my book on Perspective, is applicable to these stains, but in turret roofs they may be readily drawn parallel to the bisection of the triangle from base to apex, and will cut against the angles so as to indicate the slope of the surface quite distinctly from that of the hip. These stains, in fact, from the simple and effective way in which they show the pitch of roofs, are of the utmost value in monotints and line engravings. The contours of some surfaces, and of mouldings, may often be told by shadows of objects purposely introduced, but such incidentals are hardly available on the sloping planes of roofs. I would therefore strongly recommend the accurate representation of water stains as a legitimate and serviceable element of pictorial expression.—I am, Sir, &c.,

THOMAS MORRIS.

## LIGHT.

SIR,—In your article last week on "Light," you refer to a rule for giving the area of window surface requisite for the proper lighting of rooms, and point out that such a rule is almost valueless, in consequence of the illuminating powers of the windows depending very much upon their position, and the relative proportions of the room. Will you allow me to illustrate further the impracticability of the rule?

The rule, as you give it, is "that the area of window surface shall be equal to  $\sqrt{b, d, h}$

$b, d,$  and  $h$  representing the three dimensions of the room. Thus, if a room is 20ft. by 16ft., by 12ft. high, the area of window by this rule is 62ft." Now, if we take a room of larger dimensions than this—say, 80ft. by 40ft., by 30ft. high, we have  $\sqrt{b, d, h}$  equal

$\sqrt{80ft. \times 40ft. \times 30ft.}$  equal  $\sqrt{96,000ft.}$  equal 309 superficial feet. Here we have a room containing just twenty-five times the cubical space of the example given by you, and yet the rule allows us an area of window surface only five times greater wherewith to light it.

Again, if we suppose a room of the size I have mentioned to be divided into, say, five bays of 16ft. each, and take the area of light required for each bay separately, we have  $\sqrt{b, d, h}$  equal  $\sqrt{16ft. \times 40ft. \times 30ft.}$  equal  $\sqrt{19,200ft.}$  equal 138 superficial feet. The aggregate area of window surface in the five bays would, according to this, be 690 superficial feet, or more than twice the area given by the rule when the room is taken as a whole.

The above figures will, I think, show the worthlessness of the rule. The cause of the disparities which I have pointed out will be evident to those acquainted with the peculiarities of the square root.—I am, Sir, &c.,

WALTER H. CHEADLE.

Stafford, Oct. 6, 1874.

## WALLINGFORD GRAMMAR SCHOOL COMPETITION.

SIR,—On the 20th of May last I sent a set of drawings to Wallingford in competition for new Grammar School. Since then I have heard nothing, nor have my drawings been returned. Perhaps some of your numerous readers can throw some light on the subject.—I am, Sir, &c.,

COMPETITOR.

## CHIPS.

St. Margaret's Church, Lothbury, was reopened on Sunday, after cleaning and painting.

The Church of St. Peter-le-Poer and St. Bene't Fink, was reopened on Sunday. The whole of the interior has been painted, and the sacarium decorated according to designs furnished by Mr. Sabine, of Great Winchester-street.

A new Oddfellows' hall is about to be built at Leatholme Bridge, near Whitby, from designs by Messrs. Armfield and Bottomley, of Whitby.

The Holborn Viaduct Land Company (Limited), has been registered, with a capital of £400,000, in £1,000 shares, of which Mr. S. Morley, M.P., holds 200, and Mr. T. Brassey, 20.

The Church of St. John, Moulsham, Essex, was reopened last week, after restoration at a cost of £1,600.



## Intercommunication.

### QUESTIONS.

[3488].—Bricks.—Why is the term "washed stocks" applied to the stocks of London, and also where are the best red bricks obtainable in England, and for the London market, and what is the cost per 1,000?—B.

[3489].—Removing Paint from Stonework.—I should be glad if any reader of the BUILDING NEWS would inform me the best and cheapest way to remove old paint from stonework, without reworking?—A. C. L.

[3490].—Wrought-iron Girders.—In girders of which the flanges consist of cells or boxes, what proportion should the depth of the flange bear to the total depth of the girder? For instance, a girder measures 30ft. deep over all—what is the extreme portion of that depth that can be given to each flange if constructed on the cellular system? Please also quote the authorities for the same.—G. P.

[3491].—Testing Girders.—In testing cast or wrought-iron girders, what length of time is the proof load usually allowed to bear on the beam.—G. P.

[3492].—Wrought-iron Flange Plates.—What is the maximum thickness that wrought-iron flange plates for girders are usually rolled?—G. P.

[3493].—Disposal of Sewage.—Would any of your numerous readers kindly inform me of the best means of disposing of the sewage of a small town of about 5,000 inhabitants, and where the method suggested has been tried? (irrigation not practicable).—COUNTRY.

[3494].—Architect's Liability.—Two years after the completion of a dwelling-house the owner, in looking over the specification, discovers that the architect allowed the builder to execute some joiners' work not in accordance with the specification; it is also discovered that some plumbers' work, out of sight, has been badly done. The owner insists that the architect must pay for the work to be put exactly as in the specification. Is the architect liable?—A. B.

[3495].—Field's Tank.—Will any of your correspondents tell me the name of the manufacturer, or give me a sketch of this tank, which is recommended for the storage of slopwater in country villages? The tank when full suddenly empties itself by a siphon arrangement, thus preventing the obstruction of the drain-pipes, which is liable to occur when small quantities are dealt with without its assistance.—R. H.

[3496].—Indian Ink.—Can a reader tell me how to prevent the ink thickening, and to make it run freely from the pen? Is ox-gall the best remedy?—DRAUGHTSMAN.

[3497].—Bridges Across the Thames.—I want to know if there is any authenticated work on the new and old bridges of London, their construction, cost, age, &c.—INQUIRER.

[3498].—Construction of Concrete Houses.—Will any reader inform me of a good book on the construction of concrete houses, &c., and also the best book for architectural perspective?—A STUDENT.

[3499].—Adjusting Dumpy Level.—In one of Lockwood and Co.'s series of treatises, "The Use of Instruments," will be found a description of the process for adjusting a dumpy level. For levelling-instruments generally the following kinds of adjustments have to be attended to:—1. Adjustment for parallelism and collimation. This is effected by moving the object-glass and the eyeglass by the hand or the screws till distant objects and the cross-wires within the telescope are clearly defined. The adjustment for collimation is that required to make the optical axis of the instrument in a line with the centres of the eye and object-glasses. The way to correct any error of this kind is to turn the telescope on its axis; and by screws provided for regulating the cross wires correct for half the error, and a few trials will bring the crossing of the wires to coincide with the distant point during one entire revolution of the telescope on its axis. 2. Adjustment of the bubble-tube. This is done by parallel plate screws. 3. Adjustment of the axis of telescope perpendicularly to vertical axis. This is done by turning the instrument partly round and making the bubbles of the tubes set at right angles coincide, or appear in the centre of their runs.—G.

### REPLIES.

[3437].—Railway Curves.—As "G. P." wants to know the least radius required for a wheel base of 20ft., he may use a radius of 2,000ft.—G. H. G.

[3438].—Lattice Girders.—On reference to my question on p. 273, "Architect" will find that I did not ask for formulae for strains on the lattices, but solely for strains on the flanges. "Geometrician," in reply, gave a formula which was evidently applicable not to the flanges but to the lattices, and "Architect" in his next reply referred to this answer, and instead of correcting the mistake added to it; and further on stated that the formula he gave was for strain at centre of top and bottom flanges, thus mixing the two without distinction. "Architect's" formula for strains on flanges was only applicable to lattice girders with verticals connecting the apices and thus distributing the load equally between both flanges; but as I stated on p. 329, when the verticals are omitted the load is not equally distributed on both flanges, consequently

the opposite flanges in each bay are unequally strained, and I requested an explanation of this. "Architect" did not at any time refer to girders without verticals until last week, and even then he did not give any information on the subject, which may truly be termed ignoring it. I thank "Architect" for his trouble in replying to my question, although in doing so he has not given me the information I desired; but since writing it I have ascertained that when verticals are omitted, and when the load rests only on one flange, the strain on the opposite flange in same bay exceeds the strain on the loaded flange by the amount of half the weight on the bay.—G. P.

[3445].—Moment of Rupture.—"Architect" is again mistaken. Had I not regarded "Student's" question I should scarcely have noticed the reply thereto. I do not object to the use of the word "strain" in its proper place, and the fancy which "Architect" speaks of is due, not to me, but to universally-acknowledged authorities on the subject. I agree with "Architect" that the meaning of "Moment of Rupture" is the leverage or moment of the weight about a certain point, and also that the strain in a beam is proportional to (not directly so, mind) the distance of the weight from the point, but it does not consequently follow that the moment of rupture as professionally understood is identical with the strains produced thereby. It is absurd to say, as "Architect" does, that the strain at the centre of a beam loaded uniformly and supported at both ends is  $\frac{1}{2} W L$ , and in replying to my question No. 3438, on page 299, he himself says that it is  $\frac{1}{2} W L^2$ . We are

told that wrought iron will safely bear a tensile strain of 5 tons per square inch of section. Take an example—a wrought-iron cantilever, 10ft. long, 2ft. deep, loaded with 6 tons at its free end. The "moment of rupture" at point of support =  $6 \times 10 = 60$  tons. Now, according to "Architect" the strain = 60 tons, and tod flange should, therefore, have a sectional area of  $\frac{60}{5} = 12$  square inches, which is decidedly wrong, the true strain being  $\frac{6 \times 10}{2} = 30$  tons, and the actual

sectional area required =  $\frac{30}{5} = 6$  square inches. The "moment of rupture" is the power with which the weight acts against the girder. This is resisted by, first, the strength of the material; and secondly, the leverage with which this acts, viz., the depth of the girder. Therefore, the "moment of rupture" divided by the depth of the girder gives the strain. "Architect" states that his reply was intended (? only) for "Student," but it would be decidedly ill-natured for anyone detecting erroneous information to allow another to be misled thereby. A novice acting on "Architect's" reply would undoubtedly obtain a false idea of the "moment of rupture," and the strain caused thereby from "Architect's" misuse of the expressions, "moment of rupture," "strain," and "load" on page 330. When any person elects to deal with "technical" matters, he should study the correct meaning and use of technical expressions. Finally, I may say that I am totally unconscious of having corrected any misprint.—G. P.

[3469].—To find Diameter of Single Acting Pump.—"Tyro" can ascertain the diameter of his pump by the following formula, adding 5 per cent. to the quantity to be raised for leakage—

$$D = \sqrt{\frac{Q}{7854 LN}}$$

D being the diameter of pump in feet; Q number of cubic feet to be raised per minute; L length of stroke in feet; and N number of strokes per minute.—ZED.

[2471].—Trap for Sink.—I am surprised to read in your Intercommunication Column of practical men writing about "double-trapped drain," as I always understood that two traps in one arrangement of drain-pipes were worse than none. "Thomas" has not drawn the water-level high enough, and, being a so-called double trap, when the pressure of the gas in the upper part of his siphon trap exceeds the head of water or "drown" of the traps, both will be useless; but if he will be content with only one trap, the arrangement is the best possible for kitchen sinks. I always find that the rush of water keeps all clean.—T. S.

[3472].—Angle of Repose.—"Rankine" gives the following—Dry sand, clay, and mixed earth, from  $21^\circ$  to  $37^\circ$ ; damp clay,  $45^\circ$ ; wet clay, from  $14^\circ$  to  $17^\circ$ ; shingle and gravel, from  $35^\circ$  to  $48^\circ$ ; peat, from  $14^\circ$  to  $45^\circ$ .—G. P.

[3480].—Sewer Gases.—Why the bad smell arises from air-shaft is probably because it is the only ventilator. Under the circumstances, one of Latham's charcoal ventilators would be desirable, placed at the summit of shaft; or a tray filled with charcoal protected from moisture. It would be better, however, to carry up the shaft higher, or place a ventilating pipe from it.—G.

[3484].—Curved Girders.—E. W. Young's "Scraps on Girders, Arches, and Trusses," published by Macmillan and Co., also Humber's "Handybook of Strains," published by Lockwood and Co., treat this subject pretty well.—G. P.

[3485].—Shearing Strain.—Shearing force at any part of a girder is  $P - W'$ , or  $P' - W'$ , the greater of the two to be taken. P and P' are the reactions on

supports due to load; W = load between support and point of shearing force; W' = load between the other support and point.—G.

[3486].—Mouldings.—A very effective kind of moulding for a small room is a bold cavetto or hollow springing from wall, terminating with a small ogee or torus near ceiling, with a fillet between; or a reversal of this, the hollow being at the ceiling.—G. H. G.

### STAINED GLASS.

LANCASTER.—A new painted window has just been fixed in St. Mary's Church, Lancaster, in memory of the late Lancelot and Agnes Sanderson. The window was designed and executed by Messrs. Mayer and Co., of Munich and London.

MUNICH GLASS.—One hundred cartoons, by Schwind, Schnorr, Kaubach, and others, the original drawings of many beautiful church windows executed at the Royal Institution for Glass-painting (Königliche Glasmalerel) in Munich, will shortly arrive in London. These cartoons are the property of Herren Merkel and Bachmaier, the directors of the Munich Gallery, who intend to exhibit them at the Crystal Palace, as no other place large enough for them can be found.

### WATER SUPPLY AND SANITARY MATTERS.

WIMBLEDON.—The long-discussed question of the disposal of the sewage of this town has now been set at rest by the acceptance by the Wimbledon Local Board of the greater part of the tenders for the erection of the works necessary to perfect a thorough system of drainage throughout the parish. Contracts have been accepted for the construction of deposit tanks, filter beds, &c., at the sewage outfall works, a short distance from the level crossing of the London and South Western line of railway at Garratt, at the sum of £10,433, and also for the construction of the high level, middle level, and low level sewers, with their branches, at the aggregate price of £30,390, 17s. 2d. The Local Board has now advertised for contracts for the completion of the remaining works at the outfall. The contractors, Messrs. J. Neave and Son, have already commenced operations at the outfall works, and have begun to lay down the pipes in different parts of the parish, so that it is hoped the sewage question will be at last brought to a satisfactory conclusion.

### LAND AND BUILDING SOCIETIES.

BOLTON UNITY PERMANENT BUILDING SOCIETY.—The second annual meeting of this Society was held last week. The balance-sheet, which was adopted, showed that in September, 1873, the balance in the bank was £412. 7s. 3d.; amount of monthly unadvanced share subscriptions, £772. 5s. 10½d.; property sold, £360; which, with other items, brought up the total receipts to £1,612. 2s. 4½d. The expenditure included £124. 15s. 9d. for shares withdrawn; £660 advanced on mortgages; £400 purchases of property, leaving £402. 4s. 2½d. balance in the bank, besides smaller payments.

BUILDING SOCIETIES' PROTECTION SOCIETY.—The annual meeting of the members of this Association was held on Friday last at the Guildhall Tavern, under the presidency of Mr. W. T. McCullagh Torrens, M.P. The report of the executive committee stated that it was with pleasure they reported that, after four years of unremitting labour, the Building Societies Bill, promoted by the Association, passed the House of Commons on the 20th June, 1874; the House of Lords, 22nd July; received the Royal assent 30th July; and would come into operation on the 2nd November next. The great pressure of work which has fallen upon the Committee in connection with the Building Societies Bill had quite precluded their giving their attention to other matters, and the presentation of accounts and the annual meeting of the members of the association had therefore necessarily been deferred. The balance sheet showed that since the last audit £336. 1s. 3d. had been received, £151. 12s. 6d. of which was subscribed towards the Parliamentary fund. The expenses in connection with the Bill had nearly all been discharged, and there remained in hand the balance of £23. 6s. 9d.

CONSERVATIVE LAND SOCIETY.—A meeting of this Society was held on Tuesday at 44, Norfolk-street, Strand. In laying before the shareholders of the Conservative Land Society their eighty-eighth quarterly report, the executive committee drew attention to the satisfactory returns for the financial year which terminated on the 30th ultimo. The total withdrawals under the rules since the formation of the Society (1852) to Michaelmas, 1874, were £599,889. 12s. 10d.; the number of the last share issued to Michaelmas was No 39,852; the reserve or surplus fund to Michaelmas, 1874 (exclusive of office premises and furniture account, &c.), amounts to £9,000. The annual general meeting of the members will take place at the Norfolk-street offices on Tuesday, the 8th day of December next, when the accounts and balance-sheet for the financial year will be presented.

KNIGHTSBRIDGE BUILDING SOCIETY.—This society, which is mutual and terminable, held its third annual



meeting on Wednesday week, at No. 5B, Sloane-street. The report showed a balance—August 1st, 1873, £385. 13s. 5d.; cash receipts for the year ending July 27, 1874, £1,457. 1s. 11d.; outlay, £2,266. 11s. 2d. There was profit in the year £80. 9s. 3d., and on capital account a surplus of £190. 2s. 8d. There had been fifteen appropriations of £250 each, and advances made £3,370.

## Our Office Table.

**THE NEW STREET FROM OXFORD-STREET TO OLD-STREET, ST. LUKE'S.**—An important step towards the carrying out of this improvement was taken by the Metropolitan Board of Works on Friday last, viz., the acceptance of the tender of the Bridge and Roofing Company, Darlaston, for the construction of the iron bridge to carry the new street across the Metropolitan Railway for £18,250. The works will be commenced at once. The new street, as our readers may be aware, will commence at the east end of Hart-street, New Oxford-street, and will be carried eastward nearly on the lines of Theobald's-road, King's-road, and Liguorpond-street, to Back-hill, Hatton-garden, whence it will be carried across the Metropolitan Railway, a little to the south of the Middlesex Sessions-house, proceeding eastwards across Red Lion-street, St. John's-square, and St. John's-street, Clerkenwell, to Wilderness-row, which will be widened and curved slightly to the south-east at the Goswell-road end, so as to be exactly opposite Old-street. The length of new street to be made will be very short, most of the streets named being widened and improved as to their lines of frontage.

**STREET GAS LAMPS.**—The new system of supplying gas to the public lamps by meter has been inaugurated in Paddington, after a lengthened opposition to the scheme on the part of the Imperial Gas Company. The question has been submitted to the gas referees, Dr. Pole, Professor Tyndall, and Mr. Vernon Harcourt, and their award was against the objections raised by the company. It is believed that by the new method a saving of about £2,000 a-year will be effected. The outlay for putting the scheme into operation has amounted to £1,200, that sum having been collected in the rates.

**INTERLOCKING ROOFING TILES.**—Messrs. Wade and Cherry have forwarded some specimen models of their new interlocking roofing tiles, which are designed with a view to avoid the necessity for pointing, and the danger of displacement by wind. The dovetailed flanges of the tiles, by clasping one another throughout a roof, exclude both wind and rain, and render displacement impossible. The process of their manufacture is said to be so expeditious that its cost does not exceed that of ordinary tiles, whilst the expense of fixing them is less, inasmuch as pointing is reduced to a minimum, if not entirely dispensed with. In weight also, they present advantages, the excessive overlap of other tiles being avoided.

**REIGATE CASTLE.**—Lord Somers, lord of the manor of Reigate, has just presented to that town, in the shape of a lease to the Mayor and Corporation for 999 years at a nominal rent, several acres of land, immediately adjoining and overlooking the main street as a pleasure and recreation ground for the inhabitants. The Castle Grounds, for such they are called, possess special interest as being the site of the ancient fortified Castle of Reigate, said by Aubrey to have been built anterior to the Conquest, and supposed to have been chosen by the Romans to guard the old line of communication to Croydon. The structure has now completely vanished, its demolition having been nearly accomplished during the Civil Wars, and the only relic of it is a barbican, built out of the ruins about 100 years ago. Under the pleasure-grounds run some extensive caves, hollowed out of the solid sand-rock with remarkable accuracy, and supposed to have been contemporaneous with the Castle. The principal cave is called "The Baron's Cave," the tradition being that the confederate nobles here first debated upon and arranged the terms of Magna Charta. The aged châtelain in charge of the place never fails to point out to visitors the seat composed of Roman brickwork, where the Barons sat in consultation. A massive flight of stone steps, supposed to have led up from the caves into the Castle, still remains, and there was formerly an exit, now stopped up, into the gruff,

or dry ditch, without the Castle, and supposed to have been used as a sally-port. A part of the old moat is also included in the new pleasure-ground.

**HONOURS FOR ART AND SCIENCE.**—A new distinction—the Order of the Lyre—for persons eminent in the musical and dramatic professions, is to be created in Germany. The Duke of Meiningen is also about to give a gold medal for distinguished services in the causes of science and art. Meanwhile Mr. Ruskin, who left for Mr. Street's acceptance the medal of the Institute, has found an imitator in Russia. The Russian Imperial Academy of the Fine Arts having conferred on M. Verestchaguine the academic grade of Professor, the artist writes from Bombay to the *Voix* to say that, believing that grades and dignities in art are injurious, he decidedly refuses to accept the distinction offered him.

**WORKING-CLASS DWELLINGS AND MODEL LODGING HOUSES.**—Dr. C. Meymott Tidy's annual report of the sanitary condition of the parish of St. Mary Islington for 1873, enters at some length into the condition of the dwellings of the working classes in that district. Sadly deficient in a sanitary point of view as many of the houses are, Dr. Meymott Tidy says, "I am bound to confess that I infinitely prefer them, with all their disadvantages, to the elegant architectural buildings some good philanthropists have erected (all honour to them for doing so, although I believe them mistaken), called 'model lodging houses.'" From a social point of view I have reason to know that they are worse than failures. We are told "they are more pleasing to the eye of the passers-by." That I admit, and when you have said that, you have said all you can say for them. Cleaner outside they may be, but it is a cleansing only of the outside, and the driving inside of a nest of evils I would rather were external, because if external they are easier to cope with. Long, dark passages, with rooms on each side, like so many horse-stalls in a nobleman's stable, tenanted by different families, is not a provision likely to render the poor better morally, socially, or religiously. If you deal with the poor in masses, and house them in such a manner, it is absurd to be astonished when they take the hint and forget what is due to themselves. I am strongly of opinion that congregating the poor in large numbers in these huge erections is a great mistake.

**VALUE OF LONDON DUST.**—Suburban householders and others who find much difficulty in inducing the contractors to remove the dust and household refuse from their premises may not know that one of the causes of the irregularity so frequently complained of is the fact that dust has of late years become comparatively valueless in the metropolis. The rapid decline in its worth may be seen from the following figures given by Dr. C. Meymott Tidy, the Medical officer for the Islington district. During the three years ending June 1868 the Islington Vestry received from its contractors no less than £3,625 for dust removed from the district, while during the seven years ending March, 1875, they will have received nothing, but will have paid the contractors £20,332. Householders, Vestries, and Contractors together must look back with regret to the days when Charles Dickens' "Golden Dustman" affectionately regarded his mounds of dust as of little less value than auriferous deposits.

**TEACHING OF DRAWING IN BOARD SCHOOLS.**—At the meeting of the London School Board on Wednesday afternoon, Mr. Lucraft moved the following resolutions: (1) "That it is desirable that an inspector should be appointed to examine and generally promote the teaching of drawing in Board Schools." (2) "That systematised lessons in drawing be given to all the scholars in Board Schools of five years of age and upwards, for at least two hours in each week." (3) "That geometry be added to the list of essential subjects, and systematised instruction be given therein to the scholars in the 4th, 5th, and 6th standards, for at least two hours in each week." After a long discussion, the first resolution was negatived by 18 to 7, and the following resolution adopted in lieu of the 2nd and 3rd resolutions proposed by Mr. Lucraft, viz., "That systematised lessons in drawing be given in all Board Schools, so that the scholars may have the opportunity of learning drawing, and that it be referred to the School Management Committee to consider and report as to improved arrangements for teaching drawing in the Schools of the Board."

## CHIPS.

The directors of the Alexandra Palace Company have decided to open the new palace on Saturday, the 1st May, 1875. The building is now rapidly advancing, and the decorations of the interior are nearly complete.

The Nautical Commission appointed by the French Government to inquire into the merits of Mr. Liddell's plan for the formation of a deep-sea harbour, after sitting seven days, has reported in its favour by a majority of 5 to 2. A description of Mr. Liddell's scheme appeared in our last number.

A new public hall is to be built at Thirsk, at a cost of about £2,000.

New wards are about to be constructed at St. Luke's Workhouse, City-road, from plans by Mr. H. Saxon Snell, architect.

The new chancel just added to the Church of St. Michael and All Angels, Swansmore, was consecrated on Michaelmas day. Mr. R. T. Jones is the architect.

The partial trial of Dr. David Price's patent iron channel on London Bridge, has, during five years, proved so successful in resisting the wear and tear of the skidded wheels of the heavy traffic, that the invention is to be used throughout the whole length of the bridge.

The Church of St. Maurice, York, is about to be rebuilt. The contracts, which were let separately on Monday week, amounted to £5,424.

Tell's Chapel, at Kussnacht, is being restored, and the frescoes on the walls touched up.

One hundred letters written to various correspondents by Michael Angelo are to be included in the Life of the great master now in preparation by Signor Gotti.

The Corporation of Barrow-in-Furness are about to apply for Parliamentary power to extend the borough, to construct new gas and water works, and to make new building regulations.

The parish-church of Hinton Blewet, an interesting and ancient structure—once connected with Glastonbury Abbey—has long needed restoration, and measures are now being taken to this end. Plans have been obtained from Mr. E. B. Ferrey, which will necessitate the expenditure of £800.

A new workhouse is to be erected in the outskirts of Sheffield, at a cost of from eighty to one hundred thousand pounds.

The parish-church of St. Swithin, Littleham, Devon, was reopened on Sunday week, after restoration. The building is said to be nearly six hundred years old.

The Congregational Church, erected at East Dereham, Norfolk, in memory of William Cowper, and built on the site of the house in which the poet spent his declining years, has been opened.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHELVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB and SON,  
Makers to the Bank of England,  
57, S. Paul's Church-yard, E.C.  
And 68, S. James's street, S.W. [ADVT.] } London.

## Trade News.

### WAGES MOVEMENT.

**A SANITARY STRIKE.**—A strike with a novel object has occurred at the Trendon Collieries, Durham, the miners having struck for water and decency. They allege that their sufferings, owing to a want of water both for drinking and domestic purposes, have been very considerable, and that their complaints receive no attention. Acts of Parliament and orders of the Local Government Board are stated to be, as far as they are concerned, mere dead letters; and the men, who with their families number about 3,000 persons, refuse to do any more work until they are provided with a proper water supply and with decent dwelling accommodation. We trust they may be able to enforce their demands, so far as they are reasonable, and that others under similar circumstances may have the courage to follow their example.

**LEEDS PAINTERS.**—The joint committees of the Leeds Operative House Painters' Societies have addressed a circular to the master painters for an advance upon their present rate of wages. They state:—"Having abstained from making any movement last year, either for an advance of wages or for any other privileges, although considering ourselves then entitled to a higher rate of remuneration for our labour, we now more confidently address you, and in submitting a code of working rules for consideration, we desire to express our sense of humiliation at the low position we occupy in the family of the building trades of Leeds." The proposal is that from April next the standard rate of wages should be 7½d. per hour.

**NORTH WALES SLATE TRADE.**—Negotiations between Lord Penrhyn's referee and the Strike Committee threatened to collapse altogether on Tuesday; but after two interviews the referee, Mr. Wyatt, seeing the men resolute, agreed to go into the remaining cases of alleged violations of previous agreement on Monday.



## The Timber Trade.

ALTHOUGH the weather remains favourable for building purposes, there has not been any marked demand for timber during the past week. Consumers are in doubt how prices are likely to rule next spring, and there is a difference of opinion on this head between foreign and home merchants. The latter are generally blamed for absorbing the most of the profits that intervene between the shipment of a cargo and its reaching, in detail, the hands of the *bona fide* consumers. But the real facts of the case are, that the original importer seldom gets more than a fair profit on his goods. In a series of years, an importing timber merchant knows but too well that he must sell at a loss, as is proved when the year's balance-sheet is made out. He has to run the risk of having a large stock on hand when a commercial crisis at home or abroad has so influenced prices abroad, that his stock on hand must, in the very nature of things, come down in price to the level of the fresh importations. However the producers of timber may urge their claims to advanced rates (and they are urging them now), it is improbable that they will substantiate them.

The recent explosion, although fortunately attended with small loss of life, compared with what might have been expected, has another feature about it, concerning which we should be thankful. No fires were occasioned through it. But what the ghastly consequences might have been had the barge exploded in some parts of the canal, both to life and property, is of course mere conjecture. Only, so far as fire is concerned, those who habitually take a professional interest in building materials, cannot fail to remember the invention of the Rev. Doctor Jones, Principal of Harewood College, Tavistock. Setting aside for the present its claims to prevent dry-rot and decay, it is to its fire-resisting properties that attention should be at present directed. It is well known that two pyramids of wood were prepared, one being "pickled" with the preparation, and the other being unprepared. A pint of petroleum was poured over each. Fire was then applied, and whilst all that remained of the unprepared timber was the usual residuum of ashes, that soaked with the preparation remained almost intact. Two wooden houses were set fire to, one prepared, the other unprepared. In the case of the prepared house, the floor was slightly charred by a large fire being placed in the centre of the basement. The flooring in the unprepared house was completely burnt, and had time been allowed, the whole structure would have burnt. If the solution of tungstate of soda is capable of such things (and there is no room for doubt at present) it is to be hoped we shall hear more of it very soon. But its application must be cheap to be of any practical use.

The current wholesale prices of timber, &c., are as follows:—

	Per ton.	£ s.	£ s.
Barwood . . . . .	4 5	4 10	
Brazil, 2nd and 3rd . . . . .	20 0	25 6	
" unbranded . . . . .	14 0	20 0	
Brazilletto . . . . .	3 0	3 10	
Camwood . . . . .	20 0	30 0	
Jamaica Fustic . . . . .	8 5	9 0	
Campeachy Logwood . . . . .	9 0	9 5	
Honduras . . . . .	6 15		
St. Domingo . . . . .	4 15	5 0	
Jamaica . . . . .	5 10	6 5	
Cargo wood, &c., . . . . .	12 10	14 10	
Red Sanders . . . . .	6 15		
Bimas Sapan . . . . .	9 0	12 0	
Slam . . . . .	10 0	12 10	
Bahama satinwood . . . . .	7 0		
East India . . . . .	8 0	10 0	
Rio rosewood . . . . .	14 0	20 0	
Bahia . . . . .	12 0	18 0	
Lignum Vitæ . . . . .	6 0	10 0	
Cuba cocus . . . . .	5 0	7 0	
Turkey box . . . . .	5 0	16 0	
	Per superficial foot.	s. d.	s. d.
Honduras Mahogany, cargo aver.	0 4	0 5	
Mexican . . . . .	0 4	0 5	
Cuba . . . . .	0 7	0 10	
Cuba cedar . . . . .	0 4½	0 5	
Australian do. . . . .	0 3½	0 4½	
Pencil . . . . .	0 2½	0 3½	
Italian walnut . . . . .	0 4½	0 5	
Black sea . . . . .	0 3½	0 4½	
Canadian . . . . .	0 3½	0 4	
Bird's-eye maple . . . . .	0 5	0 7	
	Per square of 1 inch.	s. d.	s. d.
First yellow . . . . .	14 3	17 6	
First white . . . . .	13 6	14 6	
	Per 18 feet cube.	£ s.	£ s.
Crown Riga, wainscot logs . . . . .	6 0	6 10	
" Memel . . . . .	4 15	5 10	
Brack, Riga . . . . .	4 15	5 0	
" Memel . . . . .	3 15	4 5	
	Per 120 12ft. 1½ by 11.	£ s.	£ s.
Wyburg, 1st yellow . . . . .	13 10	14 0	
Archangel, 1st . . . . .	15 10	15 15	
" 2nd white . . . . .	10 0	10 10	
Axmar, 1st . . . . .	11 5	11 10	
Petersburg, 1st yellow . . . . .	13 10	16 5	
Quebec pine, 1st bright . . . . .	21 0	25 10	
" 2nd bright . . . . .	15 0	17 0	

	£ s.	£ s.
Quebec pine 3rd bright . . . . .	12 10	13 5
" 1st floated . . . . .	20 0	23 0
" 2nd floated . . . . .	15 0	15 5
" 3rd floated . . . . .	12 10	13 0
" 1st spruce . . . . .	13 0	13 10
" 2nd . . . . .	10 10	11 10
" 3rd . . . . .	10 10	10 15
Gefle, 1 & 2 yellow . . . . .	4 by 9	15 0
" 2½ by 7 . . . . .	12 0	
" 3rd . . . . .	3 by 9	14 10
Bjorneborg, 1st yel. M.S. . . . .	3 by 8	13 10
" 2½ by 7 . . . . .	13 5	
Kraufors, 1 & 2 yellow . . . . .	3 by 11	14 10
Stockaviken, 1 & 2 . . . . .	3 by 9	15 0
Nordmaling, 1 & 2 . . . . .	2½ by 7	11 10
" 3rd . . . . .	2½ by 7	9 5
" 1 & 2 white . . . . .	2½ by 7	9 10
" 3rd . . . . .	2½ by 7	9 0
Bjorneborg, 1st . . . . .	3 by 9	11 10
" 3 by 8 . . . . .	11 0	
	Per 120 12ft. 2½ by 6½.	
Dram, 3rd white . . . . .	2½ by 6½	8 0
" 2nd yellow . . . . .	2½ by 6½	9 5
" 3rd . . . . .	2½ by 6½	9 0
	Per load of 50 cubic feet.	
Swedish fir . . . . .	s. d.	s. d.
Riga fir . . . . .	59 0	62 6
Baltic crown fir . . . . .	80 0	82 6
Pitch pine . . . . .	90 0	110 0
Memel crown oak . . . . .	75 0	90 0
Dantzig . . . . .	110 0	160 0
Quebec large yellow pine . . . . .	110 0	160 0
" waney board . . . . .	90 0	130 0
" oak . . . . .	110 0	130 0
" elm . . . . .	160 0	180 0
" ash . . . . .	150 0	160 0
" birch, large . . . . .	140 0	160 0
Teake . . . . .	220 0	280 0

## WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay. For samples and further particulars, apply to the MANAGER, at the Quarries Narberth-road, R.S.O.—[ADVT.]

## TENDERS.

BRIGHTON.—For new girls' school in connection with the Hanover-terrace School, for the Brighton School Board. Quantities supplied by Mr. Simpson, Surveyor to the Board.

	£	s.	d.	Deduct.*
Kemp . . . . .	1,350	0	0	230
Bruton . . . . .	1,090	0	0	70
Hindess . . . . .	1,080	10	0	25
Lockyer . . . . .	1,045	0	0	45
Nash and Co. . . . .	1,038	0	0	26
Barnes . . . . .	1,027	0	0	40
Cheesman and Co. . . . .	990	0	0	30
Botting . . . . .	910	0	0	50
Spreadborough and } Feldwick . . . . .	899	0	0	60
Stepping (accepted) . . . . .	870	0	0	40

\* If Portland cement be substituted for brick and stone facing.

BRIGHTON.—For new Club in the King's-road, Brighton, for the Brighton New Club Co., Limited. Mr. Thomas Lainson, architect. Quantities supplied by Mr. B. H. Nunn.

Scrivenner and White (too late) . . . . .	£14,998	0	0
Brass . . . . .	14,935	0	0
Waldram and Co. . . . .	14,890	0	0
Manley and Rogers . . . . .	14,826	0	0
Dove Bros. . . . .	14,795	0	0
Browne and Robinson (too late) . . . . .	14,750	0	0
Newman and Mann . . . . .	14,720	0	0
Lockyer . . . . .	14,370	0	0
Merritt and Ashby (too late) . . . . .	14,300	0	0
Cheesman and Co. . . . .	14,073	0	0
Howard . . . . .	13,970	0	0
Barnes (accepted) . . . . .	13,770	0	0
Eldridge (withdrawn) . . . . .	11,550	0	0

BURTON-ON-TRENT.—For the following schools, Burton-on-Trent District School Board, Messrs. Giles and Brookhouse, Derby, architects. Quantities supplied.

School at Horninglow.			
Neale and Beach . . . . .	£2,631	18	7
Smith . . . . .	2,400	0	0
Maddocks . . . . .	2,279	18	0
Wileman . . . . .	2,222	0	0
Bowler and Bick . . . . .	2,200	0	0
Potter . . . . .	2,186	0	0
Mason (accepted) . . . . .	2,130	0	0
School at Stretton.			
Neale and Beach . . . . .	1,504	7	6
Wileman . . . . .	1,379	0	0
Hadfield . . . . .	1,332	0	0
Smith . . . . .	1,300	0	0
Maddocks . . . . .	1,276	0	0
Mason (accepted) . . . . .	1,265	0	0
School at Uxbridge-street.			
Hunter . . . . .	3,215	0	0
Maddocks . . . . .	3,130	0	0
Bennett . . . . .	3,075	0	0
Mason . . . . .	3,060	0	0
Wileman . . . . .	3,038	0	0
Chamberlain . . . . .	3,025	0	0
Hadfield . . . . .	2,900	0	0
De Ville . . . . .	2,874	0	0
Smith (accepted) . . . . .	2,790	0	0

CHELSEA.—For the restoration of Lord and Lady Dacre's tomb, Chelsea Old Church, for the Churchwardens.

Philip (accepted) . . . . . £110 0 0

CAMBERWELL NEW ROAD.—For the Catholic and Apostolic Church. Messrs. John and John Belcher, architects. Quantities by Mr. T. B. Insoll.

Simpson . . . . .	£9,647	0	0
Conder . . . . .	9,598	0	0
Colls and Sons . . . . .	9,470	0	0
J. and F. Coleman . . . . .	8,888	0	0
Downs and Co. . . . .	8,830	0	0
Thompson . . . . .	8,660	0	0
Jarrett . . . . .	8,286	0	0
Bracher and Son . . . . .	7,790	0	0
Gregory . . . . .	7,733	0	0
Braid, Jopling and Co. . . . .	7,600	0	0

CITY.—For Barbican Chambers. Mr. Stone, architect.

Nightingale . . . . .	£3,484	0	0
Merritt and Ashby . . . . .	3,355	0	0
Bangs and Co. . . . .	3,280	0	0
Crabb . . . . .	3,252	0	0
Shurmer . . . . .	3,099	0	0
Perry and Co. . . . .	3,098	0	0
Elkington . . . . .	3,025	0	0

CLERKENWELL.—For the construction of iron bridge to carry the proposed new street from Oxford-street to Old-street, St. Luke's, over the Metropolitan Railway. Sir J. Bazalgette, engineer.

The Bridge & Roofing Co., Darlas- }  
ton (accepted) . . . . . £18,250 0 0

DERBY.—For the remaining portion of the New Workhouse at Derby. Messrs. Giles and Brookhouse, architects, of Derby.

J. and E. Wood (accepted) . . . . . £22,000 0 0

DERBYSHIRE.—For levelling and draining a new cemetery at Codnor. S. J. Barber, surveyor, Eastwood, Notts.

Marsh . . . . .	£354	10	0
Shum . . . . .	324	16	0
Fretwell . . . . .	312	0	0
Palmer (accepted) . . . . .	275	0	0
GRANTHAM.—For a hospital. Mr. R. Adolphus Came, architect. Quantities by Mr. Heelis.			
Nightingale . . . . .	£5,588	0	0
Longley jun. . . . .	5,450	0	0
Pattinson . . . . .	5,122	0	0
Rudd and Son . . . . .	5,000	0	0
Foster . . . . .	4,822	0	0
Challens . . . . .	4,635	0	0
Hobson and Taylor (accepted) . . . . .	4,455	0	0

HACKNEY.—For the supply of granite for the stoneyards of the Hackney Union.

Fenning (accepted) 10s. 6d. per ton.

IPSWICH.—For building a pair of villas for Mr. Spinks.

Mr. E. White, surveyor.			
Grayston . . . . .	£484	0	0
Pells . . . . .	444	0	0
Trew . . . . .	425	0	0

IPSWICH.—For making up Benet-street, for Sanitary Authority. Mr. E. Buckham, surveyor.

Fisk . . . . .	£170	0	0
Trew . . . . .	141	0	0
Flude . . . . .	132	0	0
Kerridge (accepted) . . . . .	125	0	0

IPSWICH.—For laying drain, Portman-road.

Grayston . . . . .	£34	10	0
Trew . . . . .	77	10	0
Kerridge . . . . .	74	0	0

IPSWICH.—For making up Christchurch-street. Mr. E. Buckham, surveyor.

Flude . . . . .	£409	0	0
Kerridge . . . . .	375	0	0
Welding . . . . .	358	0	0
Trew (accepted) . . . . .	359	10	0

IPSWICH.—For alterations to St. Helen's Church.

Cunnold . . . . .	£977	0	0
Smith . . . . .	913	0	0
Bennett (accepted) . . . . .	862	0	0
Luff . . . . .	796	0	0

KENT.—For erecting four houses, containing 30,756 cubic feet, being the second portion of west wing of the London Foresters' Asylum, Bexley Heath, Kent. Mr. W. F. Potter, architect. Quantities by Mr. O. R. Griffiths.

	Houses	Boundary Walls.
R. and J. Butler . . . . .	£1,011	0 0 0
Woodward . . . . .	927	0 0 0
Gammou and Sons . . . . .	923	0 0 0
Carey . . . . .	888	0 0 0
Sabey and Son . . . . .	850	0 0 0
Larke . . . . .	840	0 0 0
Knight . . . . .	747	0 0 0
Ellingham . . . . .	720	0 0 0
Burton . . . . .	670	0 0 0
Vickery (accepted) . . . . .	655	0 0 0
Clarke . . . . .	641	10 0 0

MARYLEBONE.—For board-room and registrar's and other administrative offices in the New-road, for the Guardians of the Poor of the Parish of St. Marylebone. Mr. Henry Saxon Snell, architect. Quantities supplied by Messrs. Lansdown and Pollard and the architect.

Garrod and Smith . . . . .	£7,800	0	0
Altchison and Walker . . . . .	6,845	0	0
Temple and Forster . . . . .	6,444	0	0
Wall Brothers . . . . .	6,698	0	0
Chappell . . . . .	6,460	0	0
Simpson and Baker . . . . .	6,400	0	0
Staines and Son . . . . .	6,186	0	0
Bracher and Son . . . . .	5,995	0	0
Bangs and Co. . . . .	5,914	0	0
Braid, Jopling, and Co. . . . .	5,900	0	0
Crockett (accepted) . . . . .	5,899	0	0
Lovell . . . . .	5,287	10	0

WALWORTH.—For the enlargement of the Flint-street schools, Walworth, for the London School Board Mr. E. R. Robson, architect.

Cook . . . . .	£8,985	0	0
Newman and Mann . . . . .	8,972	0	0
Downs . . . . .	8,848	0	0
Marsland . . . . .	8,730	0	0
Thompson . . . . .	8,724	0	0
Hill, Higgs, and Hill . . . . .	8,433	0	0
Tyerma . . . . .	8,384	12	0
Cooke and Green . . . . .	8,317	0	0
Nightingale (accepted) . . . . .	8,183	0	0



## THE BUILDING NEWS.

LONDON, FRIDAY, OCTOBER 16, 1874.

## THE CHURCH CONGRESS ON THE ADAPTATION OF ECCLESIASTICAL FABRICS.

MR. BERESFORD HOPE, at the meeting of the Church Congress at Brighton last week, opened the discussion of a subject that at present occupies a more than ordinary share of public attention. The diversity of views entertained by the readers and speakers is the most important fact to notice. The clerical element preponderated, as was to be expected, though a vigorous lay minority tempered the proceedings, and gave a substance and form to the discussion. We have both the sacramental and congregational—the sacrificial and the numerical—ideas of public worship, and their corresponding ideals of church arrangement, brought before us; and the primary question becomes less which of these two ideals should be regarded, than what compromises can be made between the two conflicting parties that shall guide the architect in the design of new churches and the appropriation of old ones. This at least is the practical issue. The reconciliation of the two ideals will always remain as a problem too recondite for present solution as long as mankind think and feel differently, though how best to utilise our churches to meet the wants of large congregations and parishes is a matter of more immediate concern.

Mr. Hope pointed out that the church of every communion, if true to its nature, must vary as the worship of that communion varied. This is a postulate readily conceded, and the gist of his remarks pointed to a plan of church which we have before frequently suggested in these pages—one giving a more concentrated area to the congregation than the traditional long and narrow nave and aisles. Mr. Hope showed that a church intended to supply the claims of English use "must be broad in proportion to the number provided for; for if the nave be narrow, it must also be so much too long that many would be thrust out of ear-shot and eyeshot of psalms and altar service." There was no reason, he said, beyond mere prejudice, why at times we should not construct circular or polygonal naves. Certainly not; but we imagine this would be a sin against correct ritual arrangement, and would certainly not be in accordance with the notions of some of our ritual architects. The following speaker, Mr. Street, contended for a very opposite motive when he said that "our parish churches should be considered with a view to the glory of God, and not the comfort of worshippers." It may be reasonably asked why the glory of God and the comfort of worshippers may, or should, not be identical, and whether the realisation of worship is not best attained by a regard for the worshipper's comfort? The spirit of Christianity would certainly incline us to this opinion. It is not, at least, very clear how Mr. Beresford Hope's and Mr. Street's ideals would exactly fit—architecturally, at least, they hardly could. What says Mr. Street? "Churches built originally because men wished to prostrate themselves before their God, and to offer Him their best and most precious gifts, had too often come to be regarded chiefly in reference to their area, and the possible number of seats which might be crowded round their pulpit." He advocated nothing beyond what a fair and liberal interpretation of the Prayer-book would give us. This, indeed, may mean a good deal either way, as recent decisions have taught us. It may mean a prominence to the chancel or to the congregational area. Mr. Hope's

arrangement would appear to indicate a large area for choral communions. The Temple Church and the deacon of St. Gereon, Cologne, the octagon of Ely, and the domical area of St. Paul's are types. Mr. Street, on the other hand, proposes the processional use of aisles, the formation of side chapels, and the erection of screens to inclose the "altars" in the adaptation of old churches. So far as regards the general plan of our church fabrics. As to questions of detail, the relative significance of the "altar," and the adornments of our churches, equal diversity of opinion was shown.

Mr. Hope's church ideal is a wide area, and if aisles are used, they should only be so as passages; such a plan the BUILDING NEWS has indicated. Another plan mentioned is to have the nave of one broad span of a single story, and divided by "thin pillars," as in the choir of the Temple Church, or the Church of the Austin Friars in London, now the Dutch church. The obstruction to sight and sound should be minimised. Mr. Hope also would emphasise the baptistery, and not leave the font in a corner. As a congregational service is aimed at, the chancel, Mr. Hope says, should not be raised too much above the nave. It, unlike Mr. Street's ideal, should not be too pronounced, as the stalls may be filled by persons not in orders. The rise ought to be between the chancel and altar, artistically to give dignity and prominence to the altar, and symbolically to show "how far the Holy Communion transcends all other acts of worship." Open high screens should distinguish the nave from the chancel, but they should not obstruct the sight. Provision for three or more tiers of chancel stalls is recommended by Mr. Hope, instead of one or two only, and for this reason the chancel should be broad; the church should also be high. Another important point this speaker hinted at, viz., the necessity of galleries in crowded and dear neighbourhoods. No one will deny that our galleries are hideous makeshifts as a rule; it will also be conceded that the triforium which our architects give us as an ornament may really be made useful also by being converted into a gallery. Why, as Mr. Hope said, should not the nave of a new church be invested with the proportions of an ancient minster, by the addition of a "practical congregational triforium?" In this case the necessity of raising the sanctuary or altar is increased. The eastern bay or crossing of nave should be left free of seats, and in this space the Litany desk should be placed, the pulpits and lectern being placed at the sides.

Professor Donaldson's remarks, though brief, were not very favourably received by the majority of the clerical party. He took exception to the use of the term "altar," instead of the Lord's table, which latter forms an essential object in the Communion Service. The "altar" was not found in the Prayer-book—the authority quoted by Mr. Street as being one upon which the whole question of ritual arrangement was based. Professor Donaldson's distinction is one upon which the whole subject of Church ritual turns, and though we do not desire to reopen such a purely polemical question in these pages, and one upon which so much bitter controversy has taken place, we are inclined to doubt whether any very important issue attaches to the meaning of "altar" or "Lord's table." We believe that it is as purely an æsthetic distinction as that which has substituted the word "bench" for "pew," however much the Ritualist would apply a deeper meaning to it. Every part of our church architecture has undergone a like change. The object signified has been sought to be translated into a higher purpose; an artistic halo of symbolism has been thrown round it so unlike any entertained by a past age of proverbial frigidity in the externals of worship, that the lay mind has justly felt that something more than the outward expression

was meant. Professor Donaldson proceeds to ask which is the most consistent with the sacredness of the Communion services, the Table of the Lord or the Altar of the Saint? This provoked some cheers and counter-cries; in fact, the learned Professor had touched on too knotty a point for calm discussion. He showed there was no altar proper but in the Roman Catholic Church, where it is raised over the relic of some saint. We have alluded to this because the altar-end of our churches has become to be regarded as the centre or focus of adornment, to which all the art of the building is made to concentrate. This was quite impossible under the old system of things, where the pulpit became the only point of interest. The adornment of the Communion Table, while it has lent a kind of significance to that part of a church, and has given a mystic air to our chancels, was, after all, a return to Mediæval usage—as much so, indeed, as any of those other customs Mediævalists have revived, and which have imperceptibly grown with that kind of devotional religion which has ever been espoused to the æsthetic sense. Speaking of the decorations of the altar, Professor Donaldson, representing a large section of worshippers, thought the very purpose of the altar sufficient to the devout mind to give it dignity and attraction. Now, says the same speaker, the custom of backing it with a reredos filled with sculptures was prevalent, though such decorations were forbidden in the Homilies. So calculated to excite superstitious worship were these objects that the old Cistercian churches forbade their use, and St. Bernard especially interdicted them. But the question is, Shall we retain such accessories as aids to the devotion of certain devout individuals in the church, or shall we discountenance them for the sake of their stronger-minded brethren who can dispense with these aids, and can endow with dignity the plainest purpose and object? We do not pretend to answer this question; it has a momentous bearing upon Church matters generally, and we think time will satisfy the most ardent declaimer. The point more particularly worth notice is the attitude of this kind of art—the ideals set up by the two parties. We, at least, have a right to expect that our Church art shall not suffer by comparison with Mediæval; that it shall be as representative and expressive as we can make it; not imitative of the ascetic, not crude and inartistic in its figures, and not given to devices which only had their counterparts in a past age of religious terrorism.

Mr. Street advocated more liberality in ornament, more ritual, and more stateliness in our churches and their services; the great object, he said, was the celebration of the Eucharist, and all other wants should be made accessories. Again, there must be something attractive in the building, which should always be open for private prayer. That attraction should be the altar protected by screens, or if need be, two or more altars, the chancel altar being reserved for important services, and a second altar in the nave, side chapel, or transept for the use of low and daily services. Professor Donaldson protested against two altars, as creating a distinction of classes of worshippers. Mr. Street aptly spoke of appropriated seats in churches as deterring a great many from entering the church. There is a strong feeling, indeed, for their abolition, and on architectural grounds there exists even a stronger reason for their removal. Still we think movable benches are better than chairs, which have lately been largely introduced. The removal of galleries may be desirable for the sake of architectural effect, and we may add also of convenience; but we cannot see a better contrivance in town churches. They are better as an alternative than overcrowding, and, as Mr. Hope remarked, may be introduced as a triforium, and made an integral part of the structure.

The use of screens is prominently noticed by Mr. Street. They were considered in two



aspects; they were used æsthetically as lending an air of mystery to the chancel, and in dividing the altar and choir from the congregational area. In the adaptation of old fabrics, as when a tower was removed, or when the position of the altar required some kind of division, screens were useful, though there is a strong feeling against their re-employment in new churches as an integral feature. From the remarks of Mr. Street it is obvious he would employ them for other reasons, as he speaks of the restoration of the old lofts—rood-lofts—on the top of the screens, as both useful and ornamental, though we much question whether any use could be assigned to them. As to restoration, he said our Mediæval churches did not need more than a faithful restoration to the state in which they had been left by their builders, merely adding altars for the daily celebrations of the Holy Communion in the way already hinted.

Mr. Street must have been joking when he said, speaking of galleries converting a church into an auditorium, that if they "are really desirable it would seem reasonable to have tiers of them arranged round the pulpit instead of only one." Whether Mr. Street also meant his suggestions for developing and improving our new churches we cannot say; but he spoke of broad naves with narrow aisles, with an apsidal east end out of a side of which a chancel may open; or the chancel may be brought out into the nave with low screens, or the choir and its stalls may be placed in the midst of the people, and the Lessons and Gospel read from basilican amboes at the sides; or the domical plan for our nave may be used, gathering the people round pulpit or altar. We should be heartily glad to see Mr. Street practically carry out these suggestions; he would be doing a great work of Church reform, and helping onwards the ideas of those who have long past endeavoured to give more usefulness to our churches by developing their plans to meet existing and congregational wants. But Mr. Street has not shown us this earnest yet, and we cannot think he means it when, at the conclusion of his address, he says our architects must recollect ample and dignified chancels, large vestries for choir and clergy, are all to be as much thought of as the accommodation of the people. We cannot see how we can draw people to hear sermons by capacious naves, and, at the same time, emulate the zeal of those who make it their chief object to decorate and beautify the altar. We must draw in somewhere, or give and take, at least, where cost is a question, and we hope Mr. Street will practically show how this double object can be attained.

The difficulty of the church architect is great. He has to conform to existing custom and prejudices; to give his building a church-like character, and yet to meet the particular notions of the most bigoted parishioner. Mr. Hope rightly observed that ecclesiastical art had to steer its course between the rocks of unreal antiquarianism and an unfettered originality; but the difficulty is increased tenfold when Church authorities differ so greatly between themselves. Mr. Hope plainly says there is a difference between the old and new Churches of England which ought to make the post-Reformation building something different from one of the Middle Ages. It should be simple in plan, and congregational in its arrangements. How does this theory agree with the conception of Mr. Street and his party of ecclesiologists? They tell us our old churches require only an exact restoration of their builders' intentions; they would revive screens and side altars, processional aisles, and Mediæval vestments. It is quite clear that within the pale of the Church we have reformers of art seeking to adapt it to the purpose of religion, and another party—we may call them art conservators—who believe and honestly think the only way of doing this is to repeat the forms which have become

associated with that religion. It is essential to note the distinction that while both would adorn to the utmost our church fabrics, and lavish upon them our richest and costliest art, the manner of doing this may be vastly different, and that while one set of churchmen, as the Rev. W. Cadman, Canon Hoare, and Mr. Beresford Hope would make art instrumental, the other class would exalt it into a species of religious symbolism. Between an art whose exaltation is the beautiful, the response to the higher feelings of humanity, and one purely symbolic of a creed never rising above one ideal, there is a vast difference. Ritual, as Mr. Gladstone says in his well-timed essay, is good as long as it is expressive simply, and as a natural want imposed by the heart on the body; but when it becomes a substitute—as the producing cause of the religious life—or when it is pantomimic or didactic, and attacks the tastes and feelings of the people, it is to be condemned. Ornament, in like manner, should subserve devotion, not confine it.

#### ANCIENT AND MODERN FURNITURE AND WOODWORK.\*

[THIRD NOTICE.]

FURNITURE and woodwork of Renaissance character in this country display a vigorous kind of design, which, from the recent attempts to revive the style, promises again to absorb the national taste in this branch of art; and several of the leading cabinet manufacturers and furniture warehouses in London and elsewhere are beginning to display sideboards, cabinets, and other ordinary kinds of domestic furniture of a marked Renaissance character. Not so long ago Middle-age woodwork held a noticeable position—we had various books of designs on such furniture—but it was of short duration. The public taste could hardly digest so much of stop-chamfering and notching, and all manner of quaint piercings and emblazonings, ledged doors and antique metalwork. The cabinet-maker and joiner had to unlearn the scientific rules of his art; his moulding machines were little used, and he had to turn his hand to a very different kind of work to that in which he had learnt his trade. There is much, however, to be thankful for. "Twists and scrolls, and a good deal of flimsy, unconstructive kind of woodwork that violated every correct principle of art-manufacture, were substituted by plain bevellings and chamfers, and a rectilinear mode of construction that, at least, favoured simplicity. Allusion to our church woodwork—we do not mean the excesses it has lately run to, but the less *outré* forms of Gothic design—is enough to convince us of this. But while in architectural woodwork a restraint is necessary in the forms and details, there is a mistake in adopting the same kind of restraint in ordinary furniture. Rectilinear forms are suitable in their place, but to make our drawing-room chairs and couches after this rigid model is to exceed the license of such art, and to dogmatise in it. Portable furniture like chairs should be expressive of lightness, elegance, and grace; it is not required to make them like church or school-benches. There is much that is truly characteristic and good about our old Elizabethan woodwork and furniture. There is not, perhaps, the elegance and grace found in it that we find in the Renaissance examples of France—the work of Jean Goujon, Bachelier, and Philibert de L'Orme, for instance; but we see a dependence on the architectural style—often a florid though legitimate and massive treatment of the material. What more characteristic, appropriate, and architectural can be found than the woodwork of our Elizabethan staircases, wainscotings, and ceilings? The en-

couragement given to Italian artists in the time of Henry VIII., the rank and living of the Court of that day, Wolsey's influence in promoting the arts of Italy, the genius of Holbein, who implanted his taste here, were instrumental in laying the foundation of a style which, with all its defects and occasional redundancy, had the merit of uniting some of the beauties of Classic art with our own vernacular Gothic.

A very remarkable Tudor cabinet of Holbein's style is in the Kensington collection (27 '69). The work is supposed to be a mixture of German and English. It is enriched with marquetry of coloured woods, supported by a framework of columns and intervening arches. Its date is the sixteenth century. Classical subjects, Roman cavalry combats, with various other emblematic figures, decorate the door-panels and drawers, which form portions of the entablature and other parts of the cabinet. The interior forms a sort of architectural façade, the small drawers making rows of panels. Of other cabinets or "armoires" we may notice one (No. 4238 '56) in Late Elizabethan or Jacobean, about 1620. It is in the style of woodwork of Holland House, Norfolk and other halls of the period. The flat parts are relieved by inlays of dark and light wood in lines; prismatic-like panels are used in the decoration. Of "Queen Anne" style is No. 4619 '58. It is decorated with scrolls in marquetry, a kind of seaweed pattern with walnut-wood in holly design. A cabinet or "armoire" in the fifteenth-century style, by J. C. Craze, from the late Mr. Pugin's design, No. 25 '52, is in carved oak, with brass panels and mountings. This work is well designed, and is a good specimen of the Mediæval woodwork of this revivalist. Four uprights with horizontal members comprise the panel-work. The side narrow panels are decorated with sunk geometric tracery and foliage carvings, two intertwining scrolls forming a feature. The standards or uprights are ornamented with scale-work, the horizontal upper cornice being relieved by a row of rolled leaves. A cresting of carved leafwork of very delicate kind surmounts the composition. Mr. R. Redgrave, in his report on "Design" in the Exhibition of 1851 notices this as an exception to the general want of constructive propriety and design seen in our English manufacture.

Architectural woodwork displayed, during the periods we are referring to, various conventionalisms which admit of constructive and artistic treatment; we may casually notice here the "linen pattern" so conspicuous in the old hall panellings, also the ribbon pattern; the projecting panels of prism-shape; the upright mouldings and constructional designs of the open-timber roofs, as seen at Oxford and Hampton Court. Classical details mixed with Gothic are seen in the panellings and old fireplaces of the mansions of these days, as at Crewe Hall, Speke Hall, Haddon Hall in Derbyshire; and many beautiful examples are shown in Nash's "Mansions of England." The Elizabethan style was a thoroughly national one in its treatment of wood; we may take objection to the constant recurrence of architectural forms, as façades, arches, columnar compositions of the "five orders," pediments, and door and chimney fronts; yet there was a picturesque quaintness of effect in this massive treatment of oak that, in spite of critical correctness, is still suggestive. It was essentially popular. Stair-newels and balusters show, in some of the old examples, a constructive propriety our modern skill has hardly reached. Heraldic devices, scutcheons, and scrollwork exhibited many effective designs, and grotesque terminal figures, half imitative, half conventional, gave the carver full scope for his skill and fancy; of the latter, Hatfield Hall, Crewe Hall in Cheshire, and Knowle in Kent, have good specimens. Inlaid work, as ebony inlaid in oak, was employed in the

\* "Ancient and Modern Furniture and Woodwork in the South Kensington Museum Described, with Introduction." By JOHN HUNGERFORD POLLEN. London: Chapman and Hall.



Elizabethan period, though it was rough, and improved later on.

Flemish furniture exhibited much the same general characteristics. The figure-sculpture, however, is better than ours, while some of the best productions of the Flemish artists display a higher kind of inventiveness. Our Jacobean work is tinged with Flemish feeling. No. 4239 '56 may be studied as an example of panelling. No. 156 '64 is a cabinet with bold scrollwork and good ornamental treatment.

France, however, shows the best specimens of Renaissance Art. A handsome cabinet, No. 2573 '56, of late, sixteenth-century work displays all the best traits of this kind of woodwork. There is a chaste treatment of the constructive members, the ornamentation is subordinated in the better examples, though rich; and the mouldings evince a Classical form and richness not found in Northern examples. The panels are profusely carved, without being vulgar, and there is a simplicity of outline very pleasing. The cabinet we have named above is especially worth study. The panelling of the French school of the earlier period referred to is highly suggestive for its correctness of taste and style. Table No. 7221 '60 is of walnut, supported on circular pillars, richly carved on the surface with vine foliage. A row of turned balusters with arched heads forms a connecting support, running underneath the centre of the table, and joining the two transverse plinth pieces on which rest the four pillar legs. The drawer faces are carved with well-relieved arabesques. There is a quiet simplicity of outline, though the faces and surfaces are all relieved by good arabesque designs. The design is probably one of Bachelier's or his school, about 1550. Let us take a typical example of a console table; the supports are griffins; it belonged to the Soulages collection. The same connecting arcade down the centre of table is seen. The base is richly carved, and forms a support to the legs. No. 7215 '60 is another instance; the supports are sphinxes, and the ornament acanthus scrollwork. These last examples are chestnut, and evidence an architect's hand in the subordination of the carved ornament, which is a noticeable characteristic of these French works. It may be presumed, indeed, that the furniture of this period was left in the hands of the architects who designed the houses intended to receive it. Under Louis XIV., the palaces were superbly furnished with the highest class of art. One of the most elegant specimens of French tables of the sixteenth century is No. 7216 '60, similar in general outline to those we have mentioned, an arcade with rich supports being placed longitudinally under the table slab, and having richly sculptured console ends resting on crosspieces, also chaste carved, which form the ends of the arcade plinth. French woodcarvers were in general request; panelling was generally the most ordinary finish of rooms. A conventional kind of band or scroll design, exemplified in No. 2790 '56, was a favourite kind of ornament in panels; figures and masks are often interspersed with these ribbon patterns; and the French treatment of this kind of work so far excels any of the revival designs lately attempted in this country that we point out the fact in the hope that our woodcarvers may profit from the hint. Of course we allude to the better examples of the French work dating from the fifteenth to the sixteenth centuries. Marquetry work was occasionally resorted to, though this species of decoration was chiefly adopted by the Germans and Italians.

Germany showed in its furniture a more Italian spirit than either England or France, and this is attributable to the Imperial patronage of the time. German woodwork was peculiarly quaint, and over-decorative. Carved woodwork in gables, house-fronts, &c., show an abundance of timber, and much

original art. The imagery of the German artist displays a rich and exhaustless store, and the architectural designs show a mastery of detail and a complete understanding of subordination of parts, notwithstanding the strangeness and humour and extravagance occasionally seen. The works of Albert Dürer attest this.

Spanish art in woodwork and sculpture reached its acme in the sixteenth century, and received its impulse from the art of Berruete and Felipe de Borgona. Toledo, Seville, and other towns were art centres. Cabinets ("bufetes") or "varquenos" displayed all the resources of Italian art, and the rich tracery, inlaid ornamentation, and arabesques of the Arab or Moorish style. They are relieved by fine metalwork and inside with painting, gilding, &c. No 1073 '71 may be cited. Cabinets and escritoirs of inlaid work, even of silver, were common. Senor Reano, in his classified catalogue of Spanish productions at Kensington, ascribes most of them to German and Italian artists and they were imported largely into Spain, though the imitation of them was practised in Spain.

Venice was a great art centre in the sixteenth century, and the manufacture of glass there promoted the art of mirror making. Previous to this time polished metal hand-mirrors were used. Gilt wood frames were extensively made and exported. Nos. 1605 '55, 5893 '59, 148 '69, 7150 '60 may be mentioned. Some of these frames display architectural compositions, as doorways, &c., relieved by arabesques and scrollwork, often violating the principles of design, which the Italian architects no less than woodworkers occasionally indulged in. No. 7820 '61 is worth inspection; it is an architectural frame surmounted by cornice, and resembles a door. The cornice, pilasters, &c., are decorated with guilloche, egg-and-tongue, and other ornaments. These are not carved, but painted in white and relieved by gilding; the ground is blue. Some of the carvings are extremely delicate. Of Italian mirrors, No. 7226 may be cited. The mirror, of burnished metal, is covered by a panel with a female bust of singular beauty. Masks and garlands of fruit and flowers in high relief adorn the frame, which is crowned by a rich cavetto cornice of shell-like pattern. No. 7694 is a circular mirror, about 1 ft. 7 in. diameter, and resembles a shield; the framework is convex, and richly carved with folial wreaths interspersed with various figures, birds, and emblems. It is said to have belonged to Lucrezia Borgia, wife of Alfonso d'Este, Duke of Ferrara, and is a highly interesting specimen of carved walnut wood. It is late fifteenth century. Gilded woodwork, chairs, carved consoles, and other ornate kinds of furniture, were produced in Venice. Carved boxwood was employed in chairs (see No. 4256) Nos. 5687 *et seq.*, and 7202 and following numbers may be noticed. No 7187 is a carved oak folding arm chair, the top back bar carved with foliage and figures of animals. It folds and forms two half-circles, one concave, the other convex. The front pieces are cusped.

Marquetry during the seventeenth century became the leading kind of decoration. It attempted pictorial subjects and perspective compositions. The Italian and Spanish cabinets are particularly to be studied for this kind of art. In England it was of late introduction. Dutch marquetry, however, became prevalent in old bandy-legged chairs, clock-fronts, and bureaux with sloped flaps. Everyone has seen old specimens of furniture whose chief value is in the quaint flowers, foliage, and other figures inlaid in natural or coloured woods. The tulip is frequently met with in the old designs in old chair-backs, and clocks, and bureau fronts. In French marquetry, ivory and ebony were often used; in Italy and Germany the ivory was engraved and otherwise relieved at salient points. One marked revolution followed the introduction of mar-

quetry work. Before, during the sixteenth century, architectural models were in vogue for furniture; mouldings and columns subdivided the surfaces—indeed, suggested the constructive framework, as we have hinted, but now a change appeared, a new ideal of furniture came up; and boxes, chests, cabinets, and other closed furniture were conceived as such; their surfaces and plain faces were regarded, and, in a great measure, a more rational kind of construction followed. Sculpture and carving also died out, and gave place to this species of inlay. French marquetry was, on the whole, more exact in execution.

Under Louis XIV. the arts made great progress. Colbert, the secretary to Cardinal Mazarin, and afterwards Minister of Finance, attained great power, and established various learned societies and art schools. In 1667 he established the celebrated "Gobelins" factory for making tapestry. The Gobelin Brothers had a dyeing establishment, and this well-known factory is still in great request. Lebrun, the painter, was the first head of this establishment, and its pictorial tapestries became celebrated all over the world. Jean Lepante was another great designer of furniture and ornament. The completion of the Louvre by Perrault, the reconstruction of the royal château of Versailles, the château of St. Germain, were works undertaken at this eventful period of Renaissance art. In the palace at Versailles the "Boule" marquetry was introduced—an invention of André Boule. It was a veneer of tortoiseshell and thin brass, and specimens are to be seen at Windsor Castle. It is called by the simple name of "Boule." Boule work is not found in the Kensington collection, singularly, though the appendix to Mr. Pollen's work fully describes several fine examples of this costly work. Subsequently Boule work was enriched by brass mounts or reliefs, and the flat surfaces of metal were chased and embossed to a high degree of art perfection, the flat chasing being relieved by the embossed metalwork. We may go on and enumerate later works in England under Charles II. and James, when a good deal of French work was imported, and the old Tudor oakwork only remained in country houses; we may scan over the exquisite carvings of Grinling Gibbons and others in the seventeenth century, during the latter end of which a revival of carving took place; but we take leave of this very interesting subject, referring our readers to the valuable illustrated catalogue of Mr. Pollen and the Kensington collection itself.

#### HISTORIC ART STUDIES.

SCULPTURES OF THE BERLIN SCHOOL, NINETEENTH CENTURY.

(With Double-page Illustrations.)

AN emotional and mystic spirit sways the South of Germany, whilst the North is pervaded by a tendency to criticism and rationalism. This at once explains the phenomenon that the South is pictorial, and the North more plastic. Munich is the centre-point of Painting, Berlin the high school of architecture and sculpture. Colour predominates in the sunny and vine-growing South; Form is the element of the North. Kant in the North propounded the grand doctrine of subjectivity in form; Fichte idealised the subject; Shelling turned more to the object in its perceptible form, whilst Hegel tried to establish a correct harmony between subject and object, the ideal and the real. In the South a reaction set in against the influences of Carstens and David. Their Classic "red-tapeism" was opposed by mighty talents, actuated by a love for Jewish-Christianity. Cornelius and Overbeck turned back to the Middle Ages, and thought themselves able to galvanise the past into real life, and in spite of their genius succeeded only in producing a ghastly and anachronistic revival. "Freedom of thought in the perception and reproduction of Nature" became the



gospel of Northern Art, thus obtaining in a higher degree the same results as the ancient Greeks with the principles of *μυησις* and *καθαρις*, with this difference, that both elements were endowed with a spiritualised individualisation. Our oft-repeated assertion that art must flourish wherever society takes a high intellectual standing would go for nothing if Berlin had no art. That its art should be cold, academical, and sometimes rather too correct, proves only the truth that art is the faithful reflex of a nation's æsthetic feelings. *Æsthetics* and *Art-History* have not been treated anywhere with more diligence and veneration than in Berlin. In spite of its known parsimony, the Government of Prussia has royally expended money on Art. It paid for the decoration of the staircase in the New Museum not less than £40,000 to Kaulbach, and had some public buildings and monuments erected that do honour to the taste and artistic culture of the city. That the artists of Berlin should be less idealistic and more realistic, less Mediæval and more Greek, is quite natural. The home of an Alexander von Humboldt, the dwelling-place of a Lepsius, Hegel, Schleiermacher, and Schasler could not but produce sculptors like Tieck, Rauch, Schinkel, A. Fischer, F. Drake, Rietschel, and Kiss. It is highly characteristic of the spirit of the people of the North of Germany that in spite of their apparent quietness, the passionate should predominate in their art. They inherited with the spirit of Aristotle also that of the heroes of the slopes of Marathon. At least half the illustrations we give are glorifications of warlike subjects. Art and Peace do not go hand-in-hand at Berlin, but Art and War. The bad geographical position of the city has had much to do with the development of this spirit. Settled on plains surrounded on all sides by hostile nations, the Prussians had to become philosophers, Egyptologists, and artists, with one hand clutching their swords. Hard study of the Greeks, Roman discipline, Spartan frugality, and Teutonic perseverance alone could secure to the Prussians a political and social condition. That in the midst of a fierce struggle for national existence they did not altogether neglect the Fine Arts deserves not only our admiration, but ought to excite in us a strong spirit of emulation. Schadow may be considered the founder of the plastic school of Berlin. He was severe, realistic, but had sufficient idealism to prevent his sinking into a mere imitator of Nature. He urged his pupils, above all, to study the Antique, and when well trained in the appreciation of ideal beauty to go to Nature to learn from her the refined characteristics of individualisation. He thus succeeded in cultivating the talent of Christian Frederick Tieck (b. 1776, d. 1851), who surpassed both his masters, the stern Schadow, and the French Classicist David. Entrusted with many orders from the Prussian Court, he was enabled to develop his talent in many directions. One of his best statues is that of the great actor and dramatic author, Iffland (see Fig. 1). We do not think that Tieck had any satirical intention in representing the most prosy German writer in the garb of a Greek tragedian. Iffland's pieces were certainly not based on the stirring conflict between inexorable fate and the limited powers of man; nearly all his tragedies were founded on the dreary want of a few pounds for house-rent, or a few shillings for a dinner. To such an extent was this the case that, by sending a five-pound note on the stage between the acts, any one of Iffland's tragedies would have been abruptly terminated. The statue is as realistic as its original, and the likeness faultless; it adorns one of the side-rooms of the concert-hall in the theatre. The pilasters of this hall are surmounted with figures apparently supporting the cornice. Though these are considered Karyatides, we should not like to classify them as such. They are so far improved that the weight does not rest on their heads; they sit

or stand, and support the cornice with their shoulders. The female figure (see Fig. 2), by Tieck, is one of these, an allegorical representative of Music. The drapery is far too rich to be really Classic. To English research and genius, to the works of Stuart and Revett, we must look if we seek an explanation of the art-revival in a purer Classic style in Berlin. It was Karl Frederic Schinkel (b. 1781, d. 1841) who, inspired by the simplicity and beauty of Greek architecture, as represented in the master work of Stuart and Revett, began seriously to teach the admirable harmony of Greek art. He saw in it an organic whole, transferred its forms to the wants of our times, and created altogether new and, though Classic, entirely modern constructions. The Architectural School of Berlin, built by him, was also decorated according to his drawings and sketches. The window casements were adorned with reliefs representing the history of architecture. These compositions are as grand as they are simple. The series begins with a representation of the Destruction of the Ancient World. On broken columns of an antique temple lies a dead youth, typifying the glorious past (see Fig. 4). Then the revival of modern times is given in robust youths constructing an arch (see Fig. 3). Some of the groups are engaged in Mediæval works, while the Genius of Art, with torches in his hands, soars above blooming flowers, exhorting humanity to new efforts; stones are heaped up, beams are cut, painters are busy, sculptors are hard at work; the world is engaged again in beautifying everything. The pale, cold winter of Mediæval gloominess has made its retreat "from churches full of the old world's night;" Art has stepped again "into day's broad light." Next to Schinkel stood the immortal Christian Rauch (b. 1777, d. 1857). The monument of Queen Louisa (see Fig. 5) finished in 1813, at Rome, is a masterpiece in every sense. Truthful to nature, he knew how to soften down reality to such a degree that his statues, in spite of their individual characteristics, became types of some universal sentiment. Death, as but the image of Sleep, is represented in the person of the lovely Queen. The couch and the drapery remind us of the best works of the Greeks. Our modern costume is anything but plastic, and yet Rauch succeeded in giving it a monumental shape. A dress-coat in marble looks like the displaced tail of a swallow pinned to a human body; our inexpressibles give the human leg a decidedly elephantine appearance. Rauch was able to endue the statue of the celebrated Marshal "Vorwärts," as Blucher was called, with some dignity (see Fig. 6). He represented him with a determined face, with one heroic thought, "to free Germany from the foreign foe," animating the very folds of his cloak. The height of the bronze statue is 11ft.; with the marble base, ornamented with reliefs, the whole monument measures 24ft. 8in. For the Walhalla, six colossal marble statues of Victory were sculptured by Rauch, of which we give one, "Victory in Expectation" (see Fig. 7). The composition is thoroughly Greek in conception, as also in execution. His master-work is undoubtedly his monument of Frederic the Great, of which the South Kensington Museum possesses an exact model in marble and bronze. The great king has been immortalised with all his companions in thoughts and in arms. Not less than 24 life-size statues, some of them equestrian, adorn the base of the monument. The four statues on the corners are Duke Ferdinand of Brunswick, Prince Henry of Prussia, and Generals Ziethen and Seidlitz. The upper part is adorned with four allegorical figures, representing Justice, Force, Prudence, and Moderation. The sides are ornamented with reliefs, historically representing the most important incidents of the king's life. In the figures and groups Rauch has shown his mighty genius in treating scenes of modern

life with great plastic power, though he is not altogether free from too pictorial a treatment of his reliefs. He succeeded in arranging warriors in wigs with pig-tails hanging down their necks in such a way as not to render them ridiculous or comical, and this is in itself a merit for which he deserves our admiration. The king is represented with a meditative expression on his sharply-marked genial features. The cocked-hat, not the most becoming head-dress, is so placed as to give the king a martial expression. The cloak falls in well-arranged folds from his shoulder. The horse is natural in its position, and full of vital reality. The statue of the king on horseback measures 17ft., and the whole monument is 42ft. high. War, and nothing but war, occupied the German artists at the beginning of this century. Even as the Greek Muse at the time of the Peloponnesian war clad herself in armour, so did the Prussian Art of this period teem with warlike groups. The square of Belle-Alliance at Berlin, which we call Waterloo-square, is to be adorned with four groups allegorically referring to the sanguinary years 1813-1815, ornamenting the base of a column surmounted by the statue of Victory. The four groups were to represent the four allied nations. We give one of the groups by A. Fischer (see Fig. 9). A powerful Saxon warrior, with battle-axe raised, is defending his slain brother-in-arms, and a leopard standing by his side, was to record England's heroic assistance. This is undoubtedly a masterly composition. F. Drake, Rauch's pupil, has a tendency to be idealistic without losing altogether the firm footing of realism. His *Niké Crowning a Warrior* (see Fig. 10) is truly genial, combining the gentle treatment of the female form with the expression of mighty force in the male body. The marble group is placed on the Palace-bridge, which is short, but 108ft. broad. Eight granite blocks are surmounted by bases of grey Silesian marble, together of a height of 15ft., ornamented with groups in Carrara marble, 8ft. high. Drake's group is the last on the southern side; the next which we reproduce (see Fig. 11) is by Schievelbein, the second on the same side, *Athené teaching a Warrior how to throw his Dart*; whilst the third (see Fig. 12), the last but one on the northern side, by G. Bläser, shows us *Minerva protecting a Warrior*. The next group (see Fig. 13) is the last on the north, by A. Wredow, and represents *Niké taking the Body of a fallen Warrior into the Land of Eternal Peace*. The groups are all in a good Classic style, full of motion, and in spite of the variety of feeling which they express, not wanting in repose. As a work of art there exists no bridge to equal that of Berlin. Should once our bridges and embankments be ornamented with similar groups allegorically representing our deeds on land and sea, in the departments of discoveries and science, we shall stand, as we ought, in the van of all other nations, even in the field of Sculpture. The means we possess; we have yet to find the ways, and these are clear. Let us devote ourselves to the culture of our taste with the same earnestness with which we foster our technical and mechanical talents, and we shall be able to laugh at those who see nothing but "rocks ahead," and think that we are fast sinking politically, socially, and artistically, simply because we are touched by the spirit of modern times, leading us to a keener appreciation of the beautiful without the aid of Assyro-Egyptian second thoughts. The statue of Rauch, by Drake (see Fig. 14), is a portrait in too realistic a style; whilst his relief from the monument erected in honour of King Frederic William II. (see Fig. 15) is in grouping and arrangement worthy of our fullest approbation. Men, women, and children, in joyful groups, are delighting in the gifts of nature. Boundless love and gracefulness stamp this relief as a masterpiece of modern sculpture. Ernest Rietschel, though a pupil of Rauch,



belongs to a different school. A spirited individualism, and great refinement of execution, but a tendency to realism, distinguish this master, who worked like Canova in all the different profane and sacred branches of plastic art. His bronze statue of the greatest and freest-thinking poetical philosopher and critic, G. E. Lessing (see Fig. 16), is in plastic truthfulness in all its details, and in its monumental simplicity, one of the very best portraits of our times. His "Pietas" (see Fig. 17), a subject used by Michael Angelo, and by a Nuremberg artist in wood, has some merit because of its architectural severity. It shows great confidence to have undertaken a subject which had been treated in so masterly a manner by the greatest genius of the Cinque-cento style. Rietschel's "Pietas" is, on account of its deep religious feeling, delicacy, and sublime ideality, one of his best works. In addition to the group which we gave in Fig. 13, A. Wredow has sculptured the statue of Paris (see Fig. 18), a cast of which has been placed in the Academy of the Fine Arts at Berlin. Originality is not the strong point of this sculptor; he strictly adheres, with little modifications, to the old Classic specimens. The female figure (see Fig. 19) in the act of spinning, by R. Schadow, is a reminiscence of his father's and Thorwaldsen's style and manner. The "Kanephoria," by L. Wichmann (see Fig. 20), is too mannered in composition and too stiff in treatment; the falling *chiton* is affectedly arranged. Far better is Iphigenia, by G. Heidel (see Fig. 21). This statue is the property of his Majesty the King of Prussia. It shows us the priestess of Diana at Tauris lost in thought, dreaming of her beloved ones from whom she is separated, and standing on the seashore longingly looking towards the beautiful land of Greece. The artist tried to put Goethe's conception into a Classic garb, and he succeeded in producing a work of the very highest merit. We give two more groups of a warlike character, the Amazon of A. Kiss (see Fig. 22), known throughout the world, and the youth fighting with a lion (see Fig. 23), by A. Wolff. Both masters belong to the sensational school, of which passion is the element, and realistic truthfulness the aim. Both groups are placed at the entrance of the Museum at Berlin, and form one of its brightest ornaments. Both masters excel more in the treatment of animals than of the human body. There is grace and gentleness in the Boy with the Swan (see Fig. 24), by J. Kalide, a sculptor with a wild fantasy, who often oversteps the boundaries of ideal beauty through his coarse, indecent realism. His Boy with the Swan is as naïve as his Bacchante lying on the back of a panther is objectionable. The position of the boy is too forced; but that of the animal is natural and spirited. This rich collection of the art products of Northern sculpture will serve to remove the prejudice that the South or ancient Greece and Rome alone can produce artists worthy to handle a chisel and able to endow marble with life-like and beautiful forms.

G. G. ZERFF.

#### SOME REMARKS ON ARCHITECTURAL FINISHES.

THAT our houses and domestic structures generally should be bereft of any visible entrance is a singular characteristic of our modern architecture. Walking along a street, or in a thoroughfare where a thickly set row of buildings lines the way, the eye seldom finds any distinction between the windows and doorways, which appear equally flat. A recessed porch or lobby is a good feature in its way, and is also a useful covering from the wet, but without some external sign it is almost as uninviting as a flat flush doorway in a wall. There is no "politeness" about it. Now a great im-

provement in this direction would be a bracketed covering or hood, or a trussed pediment, as we see in the old Classic structures of a century ago, or of which we have numerous examples about London, as for example, in Bedford-row, Holborn. A very striking manner of adding to a façade is the addition of a gabled hood, or a semi-circular or segmental pediment, springing from return members, resting on trusses or pilasters. The trusses or brackets admit of a variety of form and carving; and some of the old examples of these pediments of the Queen Anne age are strikingly telling and effective. We should be sorry to see a revival of the old "sentry-box" porch with its angle columns and pediment; nor should we like to see the open portico of the flat-topped kind, with lead for holding water and rubbish; but we can at least give a character to our fronts by accentuating the doorway and making it inviting, instead of being half ashamed of it. The objection that any projecting wood or pediment would be in the way in streets cannot be held when these headways project a distance of 12 in. to 2 or 3 ft. as a limit.

Window frames may also sometimes be made more architectural by being made to show more of the frame, or by the addition of transoms over the line of sight, and the upper part filled in with a fanlight or pivoted casement. The upper lights would form a kind of mezzanine range, and in lofty rooms, where the windows descend to the floor, the difficulty of obtaining a due proportion of light and air from the upper part is well met by such an expedient. The most effective lighting is that obtained from the sky or the upper portions of windows. Internally, these upper lights could be handsomely combined with the cornice of room, and they might form groins with a deep cove.

One other detail we may speak of here—the poverty-stricken appearance of our stair soffits in ordinary houses. Why should not cornices be run along them, instead of being mitred back at the passage and landing ceilings? In old houses we sometimes see the cornice continued, and the staircase is at once improved a hundredfold.

#### THE CONSTRUCTION OF WAREHOUSES AND WORKSHOPS.\*

THE extensive fire at Pimlico reminds us that the principles to be noticed and the details to be adopted in the construction of warehouses and workshops, &c., are subjects not unworthy of consideration and discussion. On looking into the particulars of the damage caused by this outbreak of fire, we find, as has been the case in most of the great fires that have occurred, that by far the larger portion of the loss incurred has been through the destruction of the contents of the buildings, notwithstanding the value of the premises, which were totally destroyed, was doubtless great. On dit £200,000. The Times announces that it is the intention of the proprietors of the premises recently destroyed at Pimlico immediately to rebuild them "with every known appliance and means to render them in future not only theoretically, but absolutely, fire-proof." Two acres of land, covered with warehouses that are *absolutely fire-proof* will be a sight worthy of contemplation by any architect or engineer, however great his fame or extensive his practice.

The practical man, however, whether he be architect, engineer, warehouseman, or what-not, will rather look to the facilities afforded by the peculiar construction of a set of buildings for the localisation of any fire that may break out therein, and for the security of the goods stored in the rest of the buildings, than he will to the point as to whether or not the buildings themselves would be likely to succumb to the all-devouring element. And if the safety of the goods in the rest of the building be secured, either by confining the fire entirely to the compartment in which it may have broken out, or by so doing during the time necessary for the removal of the goods from other parts of the building, he will

be satisfied that a step has been taken in the right direction.

An engineer recognises in the blast-furnace and in the puddling-furnace examples of buildings that are absolutely fire-proof—in the former, one of no mean magnitude; but, at the same time he does not lose sight of the fact that though these structures themselves are perfectly proof against the action of fire, yet those very structures are those most admirably adapted to promote the destruction by fire of any article that may be placed within them. But blast and puddling-furnaces are very costly structures, and so must any premises be that are constructed solely of fire-proof materials; that is, of brick-work and concrete composed of burnt ballast and cement. On being called upon to design a set of buildings for manufacturing or warehouse purposes, it behoves one to turn his attention at once, not to the designing of most costly premises that shall themselves be absolutely proof against the action of fire, but to the designing of such a structure or set of structures as shall be capable of being built at a moderate cost, and of resisting the action of fire and of confining the same within the one compartment in which it breaks out for at least a moderate amount of time, and which, moreover, shall possess every facility for the energetic action of firemen and others in case of an emergency caused by fire. No man can work energetically unless he feels he is not incurring more than the necessary minimum amount of danger to his limbs and life.

To insure freedom from danger for the firemen, and certainty that a conflagration will not quickly spread from one compartment to another, it is absolutely necessary that there shall be no internal staircase or means of direct communication between any of the floors; in fact, it is necessary for a first-class building not only that there shall be no internal staircase, but that every floor and the roof of the building shall be both water-proof and airtight. Each floor of a building being isolated from the one above it and the one below it by water and smoke-proof floorings, the firemen would be enabled to get above and below as well as on both sides of the one in which a fire might occur without danger or inconvenience, and thus be enabled to apply the most suitable means for the extinction of the fire.

Fireproof floorings of concrete internally supported by rolled wrought-iron joists are from fifty to sixty per cent. more expensive than floors constructed of timber, and of equal stability. A strong flooring of timber, capable of sustaining a working load of three cwt. per foot superficial with safety, may be laid on rolled wrought-iron joists placed six feet apart, without the intervention of joists of timber, by laying two layers of two-inch planks one on the top of the other, and breaking joint transversely. These planks should be tongued with 1½-inch hoop iron weighing 1½ lb. per lineal yard when galvanised, be properly nailed and trenailed to each other, and each plank should be of sufficient length to cover not less than three spans, that is be not less than (6 by 3) eighteen feet in length. The upper and lower planks should never break joint at a less distance apart than the length of span. These planks should make good to the main walls of the buildings on every side by being supported on the under side by a 4½ in. offset from the brickwork, and by being covered in on the upper side by a 2½ in. offset, as in Fig. 1.\* When these precautions are taken, a flooring is obtained that will resist the action of a fierce fire for some considerable space of time, and permit but very little smoke to pass. This mode of constructing flooring is in vogue in Lancashire. The flooring is strong and stiff when properly laid, and possesses the great advantage of not presenting a set of joists in the ceiling to the action of fire should a conflagration break out in the room below.

Warehouse flooring of the ordinary mode of construction, that is, with, say, 11 in. by 3 in. joists, placed one foot apart, carrying a single layer of flooring boards 1½ in. in thickness, is most admirably adapted to feed a fire bursting forth in the room below, whereas flames may be allowed, with impunity, to play for a very considerable period of time on a flat surface of timber, four inches in total thickness, through which there is no vent, and neither would a considerable amount of heat or even smoke, not to say fire, penetrate to the other side, that is, to the room above. The fact is well known that the power of timber

\* By W. C. HOMERSHAM, C.E., in Iron.

\* This figure will appear with the continuation of the article.



to transmit heat is very low, that of the softer woods being lower than that of those which are harder. The thickness necessary for each of the two layers of planking in the Lancashire system of flooring varies with the distance in the clear between the wrought-iron joists and the amount of working load to be provided for. Two layers of planks, each two inches in thickness, make a firm flooring, capable of taking, with perfect security, a working load of three cwt. per foot superficial, when the wrought-iron joists are six feet apart in the clear. The joists may be placed as much as seven feet apart, if selected planks of red pine two inches in thickness be used. The floors of first-class warehouses and workshops are usually constructed to carry a working load of three cwt. per foot superficial. In buildings of every description all the floors should be adapted to take a moving load of not less than  $1\frac{1}{4}$  cwt. per foot superficial. In testing the flooring of the International Exhibition building in the year 1862, eighty men placed on to seventy-nine square feet gave a load equal to 153lb. ( $1\cdot29$  cwt.) per foot superficial.

The following information may prove of use to those who may have to design a stack of warehouses or a warehouse for a particular business:—

Cork is imported in bundles 4ft. by 2ft. by 2ft., and stows in bulk at the rate of about 10lb., or  $\cdot089$  cwt. per cubic foot.

Corn in bulk at 63lb. per bushel weighs 438 cwt. per cubic foot. The maximum depth in stowing in bulk even dry corn is four feet, giving a load of 1 cwt. 3qr. per foot superficial.

Jute is imported in bales 3ft. 6in. by 2ft. by 1ft. 6in. and stows in bulk at the rate of about 28lb., or  $\cdot25$  cwt. per cubic foot.

Oilseed in bulk at 53lb. per bushel weighs 369 cwt. per cubic foot. This article may be stowed to any depth or thickness in bulk, hence the cause of the accidents that frequently occur in oil-seed warehouses. When stowed to an uniform depth of only 8ft. 2in. the load is slightly above 3 cwt. per foot superficial.

Rice in bulk weighs 74lb. per bushel, or 515 cwt. per cubic foot. This article may be also stowed to any depth or thickness. When stowed to an uniform depth of 5ft. 10in. the load is slightly in excess of 3 cwt. per foot superficial. Bags of East Indian, as imported, measure about either 2ft. 6in. by 1ft. 11in. by 9 $\frac{1}{2}$ in. or 2ft. 9in. by 2ft. by 9 $\frac{1}{2}$ in., and stow at the rate of about 38 cwt. per cubic foot or 76 cwt. per tier of bags.

Straw millboards are imported in bundles 32in. by 25in. by 3in. in thickness, and stow at the rate of about 40lb., or  $\cdot357$  cwt. per cubic foot.

Tea is imported in chests measuring about 2ft. by 1ft. 6in. by 1ft. 9in. in height, or in half chests measuring 1ft. 9in. by 1ft. 4in. by 1ft. 6in. in height. The chests and half chests of tea both stow at the rate of about 23lb., or  $\cdot205$  cwt. per cubic foot.

Wool, English, is generally packed in bags that measure 9ft. in length by 5ft. in width when empty. The bags stand when filled from 7ft. to 7ft. 6in. in height, on about six square feet of surface. Wool stows when so packed at the rate of about 14lb., or  $\cdot125$  cwt. per cubic foot. The sorting room in wool warehouses should have large windows, and those facing to the north when possible. The sorting boards, placed close to and immediately under the windows, should be 4ft. in width and 7ft. in length for each sorter. They should gradually slope from a height of 3ft. 3in. at the back near the wall under the window to a height of 3ft. 1in. at the front. The sorting-room should have a good pitch, say 9ft. 4in., to the under side of the joists, but the floors to be used for warehousing, to secure economy of space in stowing, should have a height of about 7ft. 10in. to the under side of the timber joists, or to the under side of the flooring where the Lancashire system of flooring is adopted.

Special provisions for the stowage of corn, rice, and seed in bulk will be fully considered hereafter.

The floors of warehouses for stowing tea or jute should have a height of 9ft. 4in. in the clear of the joists or of the underside of the double layer of flooring. The next best height in which to stow those articles is 7ft. 10in. to the underside of the joists. There should be a clear height of not less than 7ft. under the beams and doorways, &c., of all the floors of every warehouse, in order not to incommode the porters in shifting the goods on their shoulders.

A cubic foot of river water weighs  $\cdot557$  cwt.; ice,  $\cdot512$  cwt.; snow, as it falls, about  $\cdot08$  cwt., and snow packed about  $\cdot19$  cwt. per cubic foot.

To revert to the subject of the precautions

necessary to confine a conflagration to the compartment in which it may break out, we would recommend that, besides constructing each compartment so as to be perfectly isolated, particular attention should be paid not only to the details of construction of the windows and their shutters, but also to the positions in which they are placed.

(To be continued.)

## WATER SUPPLY AND SEWERS OF PARIS.

THE water service and the sewers of Paris have been, and still are, under the direction of M. Belgrand, Inspector-General of Ponts et Chaussées, and member of the Academy of Sciences. The sum required for the water service next year is, according to the *Society of Arts' Journal*, equal to £250,049, being £9,600 less than the expense in the current year.

The potable water of Paris is derived from the Seine and two other sources, while the watering of the streets, the supply of the public fountains, and the general cleansing, are effected by means of the waters of the Ourc, which are totally unfit for drinking or cooking. Another source is that of the artesian wells, but their cost is found to be so great that their further adoption is questionable. There are, however, at present in hand one at the Place Hébert, another at La Chapelle, and the third at the Butte-aux-Cailles.

The two sources of pure water for the use of Paris are those of the little streams of the valleys of the Dhny and of the Vanne. The waters of the former have now for some years been received in an enormous reservoir, and the canal and reservoir of the Vanne are approaching completion.

The reservoir of the Vanne at Mont Souris, just completed, is an enormous structure of two stages, arched over and covered with turf. The cost of these canals and reservoirs has been very large, but the water supply brings in a considerable revenue, and will shortly bring in more. The income from subscriptions within the city, and from a company formed to supply water in the communes without the walls, is estimated to produce £280,000 in 1875, while certain other items add £20,000 more to the amount, and gradually as the supply of water to the houses becomes general, and as cesspools give way to water-closets in connection with the sewers, the income from this source will increase largely.

Much more remains to be done before the system of sewers is complete. The great *égout collecteur*, or main sewer, was one of the sights of the Empire, and the work has been pursued, though not continuously, for twenty years. Still many small streets in the old parts of Paris have no connection with the new system of sewers, and most of the secondary streets of the suburbs have no other sewer but the gutter. Each year adds some miles to the length of the sewers, but the work cannot at present be pushed on rapidly on account of the heavy demands on the finances of the city. The budget for the coming year includes no important sewer work, but the sum required for the maintenance of existing sewers is £100,000. This also includes the maintenance of a small stream, which curiously corresponds to the Fleet in London, namely, the Bièvre, which has been converted into a sewer. The products which do not find their way into the sewers are carried away to La Villette and Bondy, and, with payments on account of public and private sewers, &c., produce £50,000. This service includes also the application of a considerable amount of the sewage of Paris to the cultivation of the market gardens of the plain of Gennevilliers.

## IMPROVED MARKET ACCOMMODATION FOR EDINBURGH.

THE Corporation of Edinburgh is at present exhibiting on the walls of the Council Chamber the plans of certain important schemes now on the *tapis* in connection with the city markets. First in order comes Mr. Morham's design for covering in the vegetable market, so as at once to convert the interior into a sort of bazaar, and afford on the level of Princes-street an agreeable promenade. This scheme, according to the *Scotsman*, is understood to be now definitively agreed upon; but the other plans, which are all from the same hand, have only as yet been generally approved of by various committees, and are exhibited with the view of ascertaining whether they meet the views of parties specially concerned.

One of these is a design for a Wholesale Fish Market, to be erected in Macdowall-street, in convenient proximity to the North British Railway. The plan shows towards Gilmore-street a stone elevation, which may be considered the main front, pierced in the centre by two arched entrances for carts, and on either side of these openings by two plain windows. On the right of the entrance are an office and store, and on the left sundry conveniences. This stone block presents towards Macdowall-street a short length of frontage, through which is the foot entrance to the market; and a similar elevation is shown in this direction by another stone block abutting upon Logan's-close at the opposite end of the site. The intervening portion of the Macdowall-street front, which extends to a total length of about 150ft., consists of wooden boarding, with iron pillars to support the roof, and is pierced by five gateways, intended to be closed, when not in use, by sliding doors.

The plan for a Retail Fish Market deals with the site on the line of Jeffrey-street, immediately to the west of the Fleshmarket-close. Towards Jeffrey-street the design presents a series of seven arches supporting an elevation pierced by double round-headed windows, the length of the frontage being nearly 100ft. Under the arches a sloping roadway, corresponding to that now existing, leads up to an open area, which will also be accessible by a stair direct from Jeffrey street, and by Fleshmarket-close on the opposite quarter, and from the west side of which a gateway will lead into the new market.

The business of the Corn Market having again outgrown the available accommodation, Mr. Morham has designed an important addition on an entirely different plan from that last resorted to. The method adopted two or three years ago was to throw back the south wall, and thus get two or three new stalls at each side. Now, however, it is proposed to construct a sort of annex with a new frontage to Grassmarket. The site fixed upon is the ground immediately to the west of the present building, and the plans show an elevation about 50ft. in height, corresponding in style with that of the existing market, yet sufficiently varied to have the appearance of an independent block. This frontage is pierced by two arched entrances, one for foot-passengers, leading by a sloping passage to the interior of the market; the other for carts, which will deliver on a stage almost on the level of the floor. Behind this front building there is added to the market an oblong space, 75ft. long by 55ft. wide, communicating with the existing area by a gap to be formed in the west wall, and covered with a roof similar to the present, but not quite so high.

The remaining plans relate to the Slaughter-houses, which it is proposed to extend by occupying an additional area to the southward. Two new blocks of building are spoken of, similar in construction and arrangement to those at present on the ground, and each containing six new killing-booths.

## FRANCIS'S CONVERTIBLE AND UNCONVERTIBLE SCHOOL-DESKS.

THE exclusive use of cast iron for the standards has in many cases prevented the adoption of convertible school-desks. The frequent repairs rendered necessary by the breakage of the standards in shifting desks, and from other causes, have militated against the advantages they otherwise possessed. Mr. David Francis, of Birkenhead, has successfully introduced a new desk, in which the standards are all of wrought iron, and consequently are firmer, indestructible, and less bulky and clumsy. The desk is constructed with standards made completely in wrought iron, welded and bolted together. A bar of extra thickness is inserted in the upright portion of the back to give greater strength, and to form a knuckle to which a moveable top is hinged. The moveable top is finished with plates or brackets formed in L iron with ratchet and tongue worked from the solid and not welded on. Plates are secured to the top by four strong iron screws, and to the standards by a bolt running through the said knuckle. A longitudinal slot is provided at the end of a tongue. The bolt has a head at one end, and is secured at the other by means of a split pin with ends turned round the bolt. By means of the longitudinal slot at the end of the tongue the moveable top can be moved to any angle, and secured in the desired position by means of teeth worked in the ratchet which catch in the upper portion of the standard. The seat is secured to



each standard by two flat round-headed bolts and nuts. To make the desk and seat more rigid, stays are fixed to the underside of the seat, and secured to standard by bolt and nut, and to seat by bolt and nut and strong iron screw. Mr. Francis has also introduced wrought iron into the construction of his unconvertible desks with very great advantage. He has sent us copies of testimonials in favour of his desks, given after trial by several well-known architects and school managers, and we recommend all in want of a good school desk to apply to him for further particulars.

#### HINTS ON SHRUBS.

AS autumn is a good season for planting, a few hints on the kind of tree suitable for suburban purposes and the atmosphere of towns may be useful. In planting a suburban residence one or two considerations should be borne in mind; first, whether the situation requires shade and protection from the road, and secondly, how this can be best attained, and what are the best trees for the purpose. Where the situation is damp and devoid of light, a circumstance attending a great many of our small villas, planting is attended with risk. Flowering plants require plenty of light and air, or what is equivalent, careful attention. Want of good drainage is most essential, as the roots of a plant no less than the leaves imbibe the gaseous elements of the air, and a saturated or waterlogged soil prevents the passage of air to the roots. Further, such ill-drained soil is always colder than drained soil, as the heat of the sun cannot penetrate through the closed pores of water-laden soil. The soil best adapted is an open friable one, so that warmth can penetrate as well as the genial shower, without being impeded or neutralised in its effect by stagnant water unable to run or drain off.

Bearing these facts in mind, the planting of villa gardens must depend on state of soil and the amount of sun they will receive during the course of the year. Again, a smoky atmosphere is injurious, and shrubs must be selected suitable for this condition. Among evergreens that may be planted are the arbor vitae, yew, red cedar, *Cedrus deodara*, *Pinus excelsa*, evergreen thorn, box, species of ivy, as the palmate and golden leaved (useful for training). The laurel, laurestinus, *Arbutus alaternus*, broom, are also useful shrubs. Loudon says the Scotch and American pines become stunted and shabby in a town garden.

Deciduous shrubs stand the smoke better. Among those recommended are: the walnut, weeping-ash, willow, oriental plane, poplars, *Sophora japonica*; lilacs, garden syringa, the sumach, *Ribes sanguineum* the hybrid, China and Bourbon roses, as the crested moss roses, *Rosaruga*.

Among Herbaceous plants are—of dwarf kinds—*Arabis montana* and Hepatica of different varieties; Asters, *C. Gargánica*, campanulas, autumnale (aconitum) and a few other varieties.

#### BURNING OF THE EAST PARISH CHURCH, ABERDEEN.

(From a Correspondent.)

ON the evening of Friday last the quiet city of Bon-Accord was the scene of a terrible conflagration, which in the space of three hours reduced to a heap of ruins one of the finest buildings in the city (perhaps one of the finest granite churches in the world), blotted out for ever the quaint old oak steeple of St. Nicholas, which for nearly four centuries formed one of the town's most prominent landmarks, and completely destroyed the magnificent peal of bells, including the venerable "Lowrie," the sweet-toned and full-volumed voice of which has called devout Aberdonians to praise and prayer from the fourteenth century.

About half-past eight o'clock smoke and flame were observed issuing from the roof of the East Church. The alarm was raised; but before the fire-brigade could get their appliances into operation, the roof had fallen in, setting fire to the galleries and pews, and illuminating the whole interior, which, viewed from Union-street, through the mullioned and traceried windows, presented a singularly grand and imposing spectacle. The efforts of the fire-brigade were directed to the old steeple, which divides the fabrics of the East and West churches; but before long it was evident that this, too, was doomed to destruction. The lead covering quickly dissolved and fell in showers

all round the spire. Dense volumes of smoke, instantly followed by large jets of flame, burst through the roof, and in a few minutes the whole structure, from base to apex, was enveloped in one devouring sheet of flame; and ever and anon as the wind parted the folds of this dazzling curtain was revealed in fiery lines against the black darkness beyond, the skeleton framework, large beams of native oak, still fresh and strong as on the day they were erected centuries ago. And now the scene was one of the sublimest conceivable; a tower of lambent flame over 200ft. in height lit up the whole city, with its sea of up-turned and awe-struck faces, in fitful and terrific grandeur. But ere long, after majestically swaying its last adieu, the cherished pride of many generations made its exit into the burning area below. Even yet the work of destruction was not complete; floor after floor of the belfry was burnt through, and the entire peal of bells fell broken in pieces into the debris below. The adjoining West Church was only saved after the utmost exertion of the brigade, assisted by the soldiers and the Naval Reserve.

The fire is supposed to have originated through some defect in the construction of the gas sunlight in the roof, and the damage, which is estimated at about £30,000, is only covered by insurance to the extent of some £7,000.

### Civil Engineering.

MILFORD HAVEN DOCKS.—A large graving dock is to be constructed at Milford Haven, 700ft. in length, 100ft. in width, and of about 26ft. depth of water. There will be an entrance lock in connection with the docks, 500ft. long, 70ft. wide, with a depth of 28ft. On the shores of both Milford and Hakin warehouses of large dimensions will be erected, the site of the whole including an area of 48 acres. Messrs. F. Appleby and Co., of Manchester, are the contractors.

PORTSMOUTH DOCKYARD EXTENSION WORKS.—The fifth of a series of six huge caissons, which have been ordered by the Government from Messrs. Westwood, Baillie, and Company, was launched from their yard on Monday. The hull is to serve the purpose of a dock gate and swing bridge, over which principle it has the great advantage of affording a road and railway of the same level as the yard on either side, and of being easy of access for effecting repairs. The dimensions of the structure are:—length, 84ft.; beam, 24ft.; height, 40ft.

A BREAKWATER FOR SWANAGE.—At a meeting of persons interested in the quarries at Swanage, last week, the advisability of making a breakwater was considered and discussed, and a committee and sub-committee appointed to take the preliminary steps to further this project. The Swanage stone is much used for street-paving and other purposes, and as the carriage of it can only be made by vessels from the port the scheme for a breakwater will be, if carried out, of great consequence in enlarging a trade even now very considerable.

THE RIVER LOIRE AMELIORATION SCHEME.—The great proposed work of the amelioration of the River Loire from Nantes to the sea has been reported on by a commission of four inspectors-general. The report declares the condition of the river to be intolerable; there is only 4m. 30 depth of water at the low tides, and often not more than 3m. 60, and the navigation demands 6m. 50. Two plans were before the commission, one by M. Carlier, who proposes a lateral canal, the cost of which he estimates at 89,000,000 fr.; the other, by MM. Partiot and Lechales, who declare that the river may be improved and dredged to the desired depth for 49,000,000 fr. The execution of this work has been under discussion for years; in 1851, especially, plans were drawn up for a system of dams to narrow the bed of the river, and convert the sides into reservoirs for the purpose of scouring it. A portion of this scheme was carried out between 1859 and 1864 with good effect, but in 1872 the high tides reduced it to the lamentable condition it is in at present. M. Carlier proposes to cut a canal to the right of the river, 30 metres wide at bottom, with a profile varying from  $\frac{1}{2}$  base to 1 in height in the rocky portions, to 5 to 1 in the soft mud. His plan is to execute the canal in three portions, each communicating at both ends with the river by

means of locks, so that they may be executed and used separately. The three sections are: the river portion proper, 12,400 metres long; the intermediate portion, 25,900 metres; and the maritime portion, 12,500 metres; in all, more than thirty miles. He proposes to construct the middle section first, hoping that possibly the upper part of the river may be deepened by dredging, and thus the upper section of the canal rendered unnecessary; which hope, however, is not shared by the chief engineer, M. Watier. It must be added, however, that whatever plan is adopted of obtaining a depth of more than six metres of water, and thus admitting large vessels, will require the construction of a basin at Nantes, which is estimated by M. Carlier to cost 27,000,000 fr., and is included in his total of 89,000,000 fr. The commission considers the estimates of M. Carlier as untrustworthy, and say that in such works the unexpected generally exceeds what was calculated, and the proprietors of the lands contiguous to the river complain that the canal will prevent the high tides from flooding and fertilising the low grounds on the right bank of the river, thus reducing the value of rental from 200 fr. per hectare to, perhaps, half that amount. The commission believes further that the bad composition of the soil would probably cause the excavation to turn out a "bottomless gulf to swallow up the Government money," and report against the project.

#### SCHOOLS OF ART.

BIRKENHEAD GOVERNMENT SCHOOL OF ART.—The annual meeting for the distribution of prizes in connection with this institution was held on Tuesday week. Mr. John Bentley, the head-master, read his annual report, from which it appeared that the aggregate number of students passing through the school had been 215, which was an increase of two over the previous year. The annual second grade examination took place on the 30th April and the 1st May, when upwards of 100 candidates presented themselves, of whom 65 were successful in passing 95 exercises; 30 obtained the mark "excellent," and 23 prizes were awarded; 65 papers obtained the mark "good," and were granted certificates; 12 students obtained full certificates, having passed in freehand model drawing, geometry, and perspective—the highest number passed in one year. The system of giving local prizes continued to work well.

BURSLER.—The annual meeting of the supporters and students of the Burslem School of Science and Art was held on Thursday week. Mr. Theaker, head-master of the Art school, reported that while the number of pupils last session was up to the average, the individual attendances were not so satisfactory, notably in the elementary classes. The Modelling Class had been well attended, and considerable progress made. The same remark applied to the advanced classes, as evidenced by the awards of the Department.

METROPOLITAN DRAWING-CLASSES.—At a public meeting held on Tuesday evening in the large hall of the Cannon-street Hotel, the Lord Mayor distributed the Queen's prizes and certificates to the successful pupils of the metropolitan schools in connection with the Science and Art Department of South Kensington. The distribution being finished, a student named Grover came forward and asked the Lord Mayor to present, in the name of the students of the various schools, an illuminated address on vellum, accompanied by a handsome timepiece, to Mr. W. Busbridge, to whose pupils 750 prizes, including the Queen's gold medal and other medals, have been awarded during the last seven years. The presentation having been duly made and fitly acknowledged, Mr. John Macgregor moved the following resolution, which was seconded by Mr. Harnaman:—"That this meeting trusts that the efforts now being made by the Government to secure a thorough technical education (through the action of the Science and Art Department, South Kensington) will continue to meet with popular support and approval." This was carried unanimously. The second resolution, moved by Mr. Soley, pledged the meeting to make every effort to insure the success of the metropolitan drawing-classes, hitherto so beneficial in imparting sound instruction to the working men and others in London and the neighbourhood.

The parish-church of Stokesley, Yorks, is to be restored, from designs by Mr. Armfield.



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## OUR LITHOGRAPHIC ILLUSTRATIONS.

## SHEPTON BEAUCHAMP PARSONAGE.

We give an illustration of this parsonage, to which we referred in our last week's issue. It has been planned to provide special accommodation for holding choir meetings, adult classes, &c. A passage shut off from the main corridor gives access to a prayer-room and study, and these, by means of an arrangement of folding doors, can be thrown together, and the whole length of the two rooms utilised; an external entrance to the passage gives admission to them without passing through the house. The prayer-room will be heated by a fire, on Captain Galton's principle, from the study fireplace. The house is built with native stone walls and dressings from the Ham Hill quarries, which are only a few miles distant. The use of this stone, on account of its rich colour and its capability of resisting weather, might with advantage be extended beyond the local limits to which it is chiefly confined. Bridgwater tiles have been used for covering the roofs, and blue lias stone for paving. The work has been executed by Mr. Davis, builder, of Langport. Mr. R. W. Drew, of 7, Queen Anne's-gate, Westminster, is the architect.

## ST. GREGORY'S PRIORY, DOWNSIDE, NEAR BATH.

A double-page illustration of the exterior of this monastic church, designed by Messrs. Dunn and Hansom, of Newcastle-upon-Tyne, appeared in the BUILDING NEWS of May 30th, 1873, together with a description of the buildings, then just commenced. The present illustration shows the interior of the choir, which is 28ft. wide and 58ft. high. The whole will be carried out in Bath stone, except where coloured stone, &c., is introduced. It will be seen by referring to the plan published with the former illustration that the aisle is continued round the apse, from which open nine chapels. After the completion of the first contract, which comprised the foundations of "church" and of "west wing" of Monastery, the foundation-stone of church was laid by his Grace the Archbishop of Westminster on the 1st of October, 1873. The west wing is now being roofed in; the cloister, in this part 153ft. long by 14ft. wide, is groined in stone. Mr. Joseph Bladwell, of Bath, is the contractor, and is also carrying out a part of the east wing and the kitchen offices.

## STALLS IN S. M. NOVELLA, FLORENCE.

These stalls, in the Choir of S. M. Novella at Florence, are magnificent examples of the intarsia work so frequently found in the great churches of Italy. The drawing of the figures and foliage with which these stalls are covered is forcibly executed, but with great delicacy of finish. The groundwork is principally walnut-wood, the enrichment in pear-wood being outlined and divided from the darker ground by the insertion of thin slips of nearly black wood, probably stained. The designs are said to be by Bacio D'Agnolo.

## NEW STABLES FOR A. MANSER, ESQ., LAMPITS.

We illustrate a range of stabling designed by Mr. Edward Burgess, architect, of Great James-street, for A. Manser, Esq., Lampits. The treatment of the building commends itself for simplicity, and there is an amount of expression in the design not always observed in works of this kind. The gable forming the washing-room is picturesquely handled, the hay-shoot, as will be seen, making a feature. The arrangement also is complete and convenient.

## SCULPTURE OF THE BERLIN SCHOOL—NINETEENTH CENTURY.

For description of figures in this double-sheet of illustrations, see Dr. Zerffi's characteristic comments on page 453.

## THE HISTORICAL DEVELOPMENT OF ORNAMENTAL ART.

THE first of the sixth course of forty lectures on this subject was delivered by Dr. G. G. Zerffi, in the Lecture Theatre, South Kensington Museum, on Tuesday afternoon at three o'clock. The lecturer commenced by saying he had spent a portion of the vacation in revisiting the rich art collections in the Louvre, the Luxembourg, the Hotel de Cluny, and the Palais d'Industrie in Paris. In the latter he had had an opportunity of seeing the competitive exhibition of the works of the different Communal Drawing Schools. Comparing these with English productions, he had been glad to find that in some respects we surpassed our neighbours, though, on the other hand, in certain directions we were distanced. Taking first the more pleasant duty of praising, he had found that we were more correct in our drawing, less flighty, and less superficial. Our technical precision was far greater than that of the French, and our works, as far as the use of material was concerned, were more thoroughly carried out. We appeared always to be working with serious minds; we calculated our forces with cool composure, and thus our productions bore all the impress of painstaking, hard-working, mechanical art, in which the technical was more valued than the ideal. In French works we found the very opposite. With them a vivid artistic imagination was at work. They were far worse copyists than we, for they constantly added something original, and even in studying from the Antique often decked the severe Classical forms in their modern finery. Their imagination was, however, cultivated, and though it sometimes rebelled against good taste and the laws of æsthetics, it was constantly active, whilst with us it appeared to slumber like the latent heat in ice. The student of ornamental art stood more in need of general mental culture than students of any other branch. The necessity for general education was daily becoming more universally recognised. Professor Huxley, Drs. Gull, Dickinson, Ferrier, and others in medicine, engineers, architects, and even tradesmen, all united in deploring our deficiency in general education. Professor Blackie, of Edinburgh, had said with great truth that "universal experience has proved that the general scholar, however apparently inferior at the first start, will in the long run beat the special man on his own favourite ground; for the special man, from the small field of his habitual survey, can neither know the principles on which his practice rests, nor the relation of his own particular art to general human interests and general human intelligence." This was the case with science, and was even more strikingly applicable to art. He (the lecturer) could not too strongly urge upon the students the necessity for the theoretical, i.e., the historical and æsthetical study of art. The historical branch made us acquainted with the gradual development of ornamental, architectural, plastic, and pictorial art. The æsthetical branch taught us correct ideas of beauty, for we required training to appreciate beauty, just as we required training to teach us to be good. Ethics and æsthetics differed but in application; in essence they were the same. As little as we could discern between good and evil if unguided, could we separate the ugly from the beautiful if we were ignorant of the principles of æsthetics. The painter who endeavoured to reproduce every minute detail he saw was no artist; the master used a few strokes, and gave us the essence of what he saw. Art was not so much to reproduce nature as to give us general natural types. Art created its own melodies, re-echoing only the harmony of the spheres; it formed its own heaven, peopling it with ideal creatures inspired by love, faith, and hu-

manity. In fact, art humanised Divinity and deified Humanity. It was utterly wrong to bring forward the cry of the physicist, "We must go to nature," into the realms of art. Science and art had undoubtedly one common source—nature; but science had to exclude all emotional and imaginary elements, and deal with the different causes that produced natural phenomena; whilst art had to sanctify these phenomena through the elements of emotion and the artist's individual imagination. Wherever the emotional and imaginary, or, more briefly, the *ideal*, was wanting, we might produce very good copies of nature, but no real works of art. It was the sacred duty of every artist, in an age which was slowly sinking into the dust of coarse materialism, to keep alive the glowing light of imagination and throw a halo of beauty over reality through artistic productions, thus demonstrating man's higher faculties in a world in which matter was obtaining so prominent a position. This could only be done by sedulously cultivating our artistic talents, which were as certainly the gift of the Creator as our powers of observation and experiment, which, according to some thinkers, appeared the only faculties in man worthy of attention. The lecturer proceeded to describe in detail the influences leading to the growth of art, and concluded his address with an explanation of the correct meaning of the terms sublime and beautiful. The lecture was illustrated by some admirably-executed diagrams showing the development of cosmolical forms in crystallisations, zoophytes, flowers, and trees.

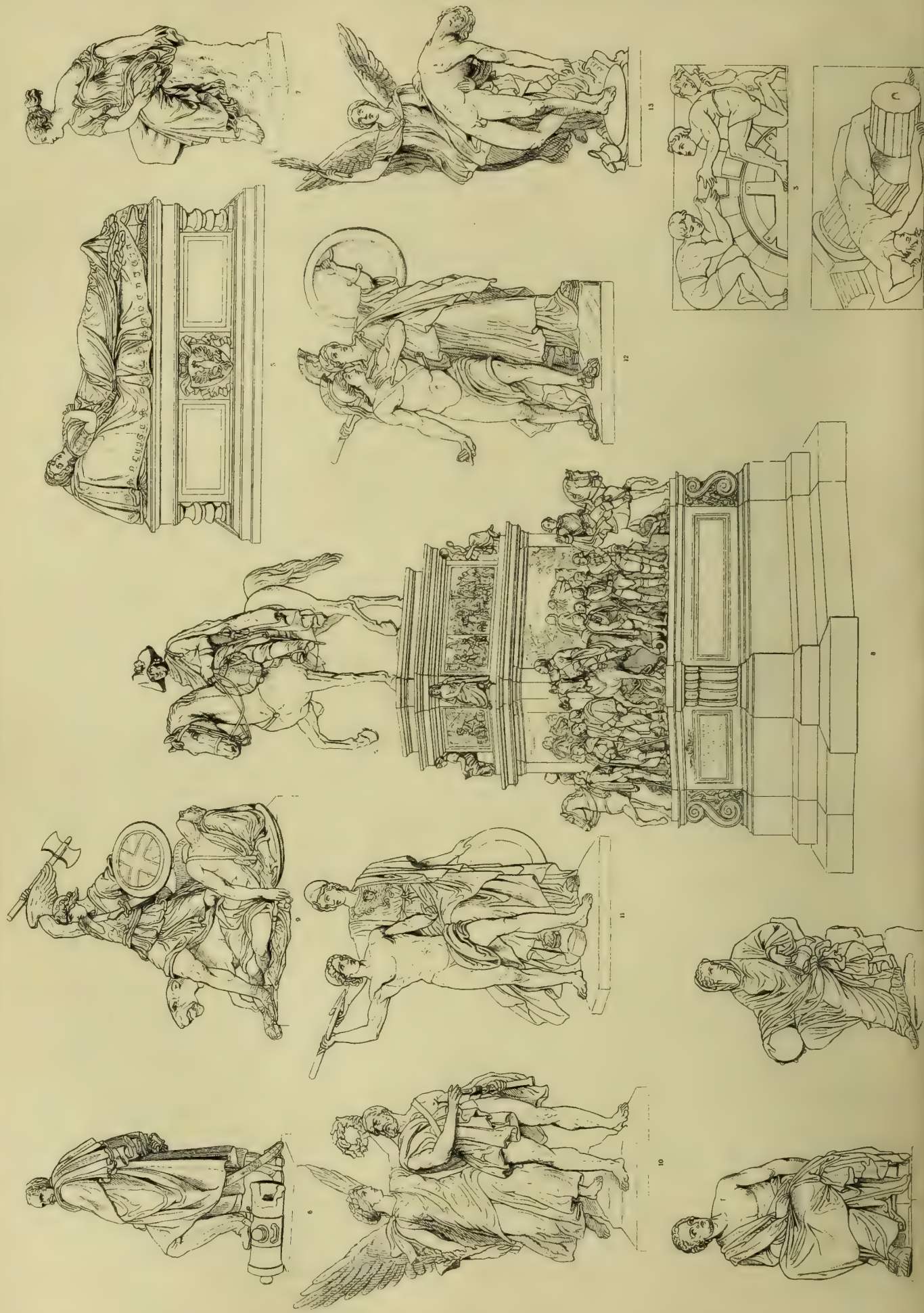
## TAKE CARE OF YOUR KITCHEN BOILERS.

IT is not often the world is startled with such an explosion as that which took place near Regent's Park a few days since. But we are all more or less liable to explosions of our kitchen boilers any day. In commenting on such an explosion which took place in Jermyn-street last week, Mr. Samuel Gale, in a letter to the *Times*, says that "every drop of ordinary water contains a small quantity of earthy saline matter in solution. When boiled it leaves this behind it, and in course of time forms a coating on the inside of the boiler, varying in thickness with the hardness of the water, the quantity that has been boiled, length of time the boiler has been at work, and the portion of the boiler on which it is deposited, those parts nearest the fire receiving the greatest quantity. If cleaning out is neglected or carelessly performed, this incrustation may be sometimes found more than an inch in thickness, and as hard as Portland stone. When this is the case the 'fur' as it is commonly called, acts as a non-conductor of heat, and the power of the fire is expended on the iron of the boiler and not on the water in it, the result being that the boiler is soon burnt away at the part where the heat is greatest and the 'fur' thickest, and requires to be taken out and repaired or replaced by a new one. This is vexatious enough with an old-fashioned range, but when the boiler is a close one, with pipes for steam or circulation connected with it, neglect might produce worse effects than annoyance. The prevention of this state of things is a simple matter, and, when compared with the cost, annoyance, and possible danger of neglect, by no means expensive. It is to have the boiler properly cleaned out at stated intervals, either by the engineer who originally fixed it, or by some other competent person. This is not a matter that should be left to a builder or house agent, but the engineer should have his orders direct on the subject. Once a year is sufficient for ordinary cases; where there is much hot water used, or where the water is exceptionally hard, it may be requisite to perform the operation every six months; but the boilers in constant use at an hotel or club-house should be 'unfurled' at least every three, if not every two months, the pipes well examined to see that they are not in the condition of the specimen I have described, and all incrustation removed from them."





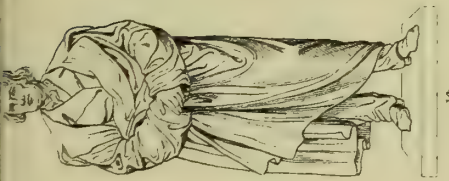








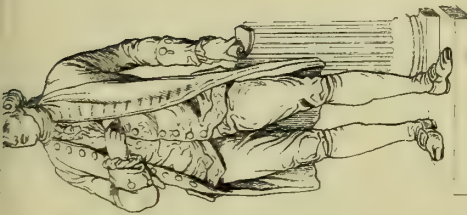
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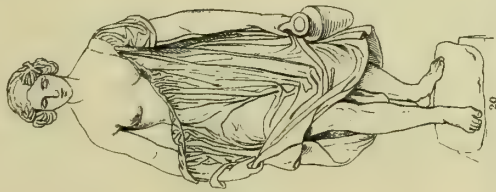
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15

# SCULPTURES OF THE BERLIN SCHOOL, XIX<sup>TH</sup> CENTURY.











S. MARIA. NOVELLA. FLORENCE.  
 . DETAILS. OF. WOODWORK. OF. STALLS. IN. CHOIR.  
 . ATTRIBUTED. TO. BACCIO. AGNOLO. ABT 1500. A.D.

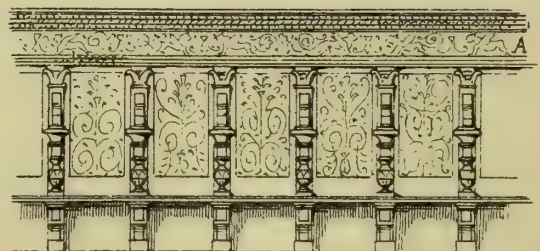
PRINCIPALLY OF BOX AND WALNUT.



. DETAIL. OF. CORNICE. TO. STALLS. AT. A



. SCALE. FOR. DETAIL.



. ELEVATION. OF. STALLS.



. SECTION.



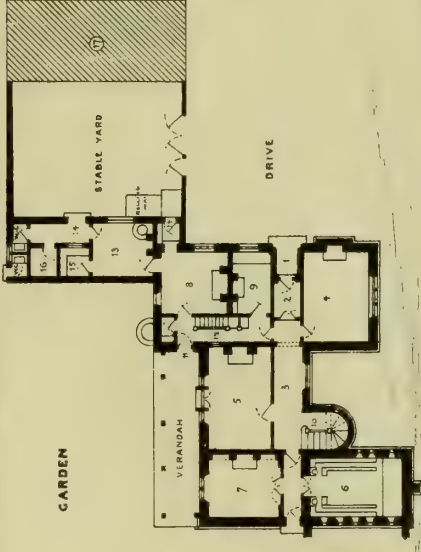
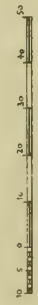




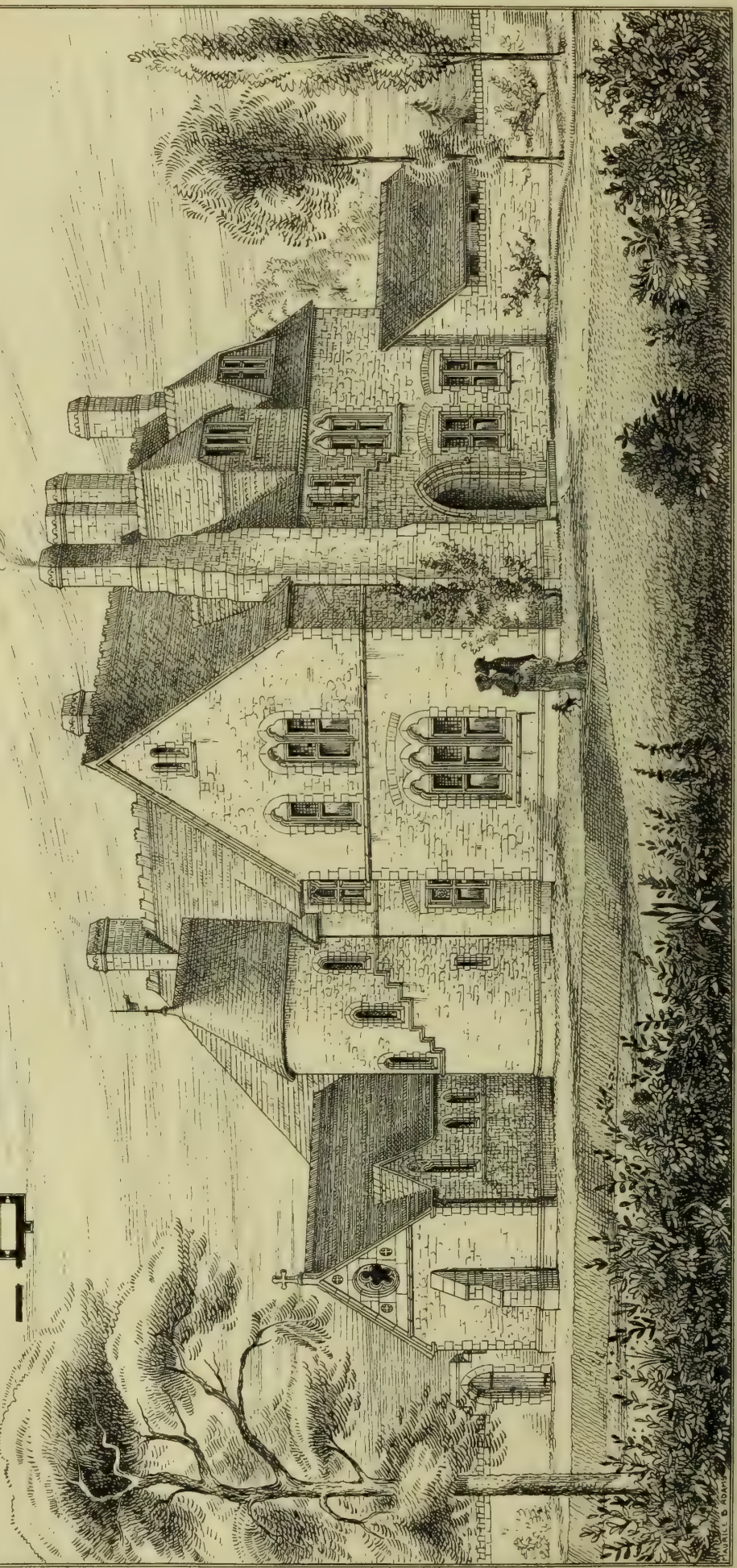
REFERENCES TO GROUND PLAN

- 1 Main Front Entrance
- 2 W.C.
- 3 Verandah
- 4 Dining Room 18'6" x 14'0"
- 5 Living Room 22'6" x 13'6"
- 6 Kitchen Room 20'8" x 13'0"
- 7 Store Room 15'6" x 14'0"
- 8 Larder 18'0" x 12'6"
- 9 Pantry
- 10 Scullery
- 11 Verandah
- 12 Bath 5'6" x 11'5"
- 13 W.C.
- 14 Verandah
- 15 Porch
- 16 Stables
- 17 Stables

SCALE OF FEET



SHEPTON : BEAUCHAMP : PARSONAGE : SOMERSETSHIRE  
RICHARD W. DREW M.A. ARCHITECT,  
QUEEN ANNE'S GATE, WESTMINSTER





New Stables for A. Manser Esq. Lampits  
Edward Burgess Architect. G. James S<sup>r</sup> Es

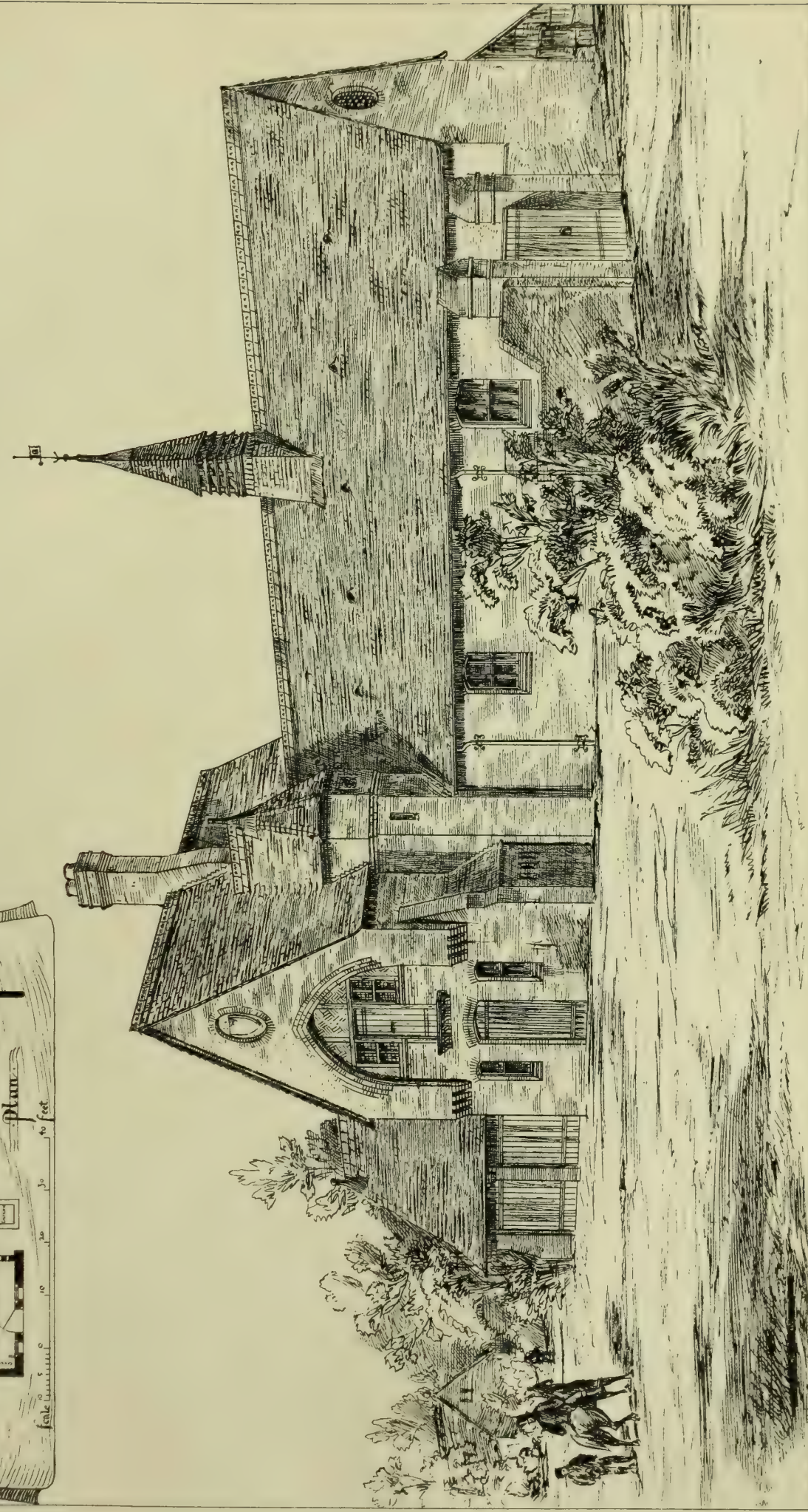
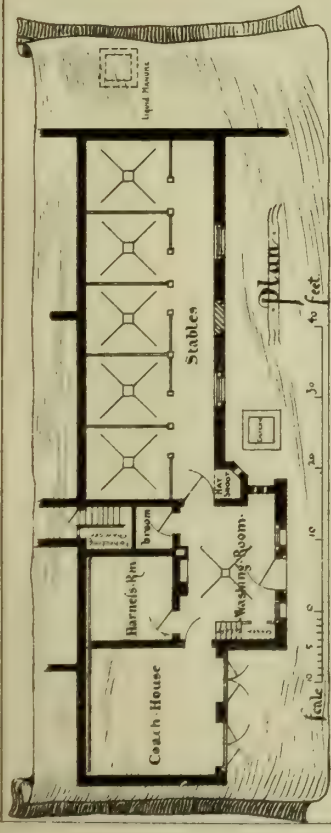
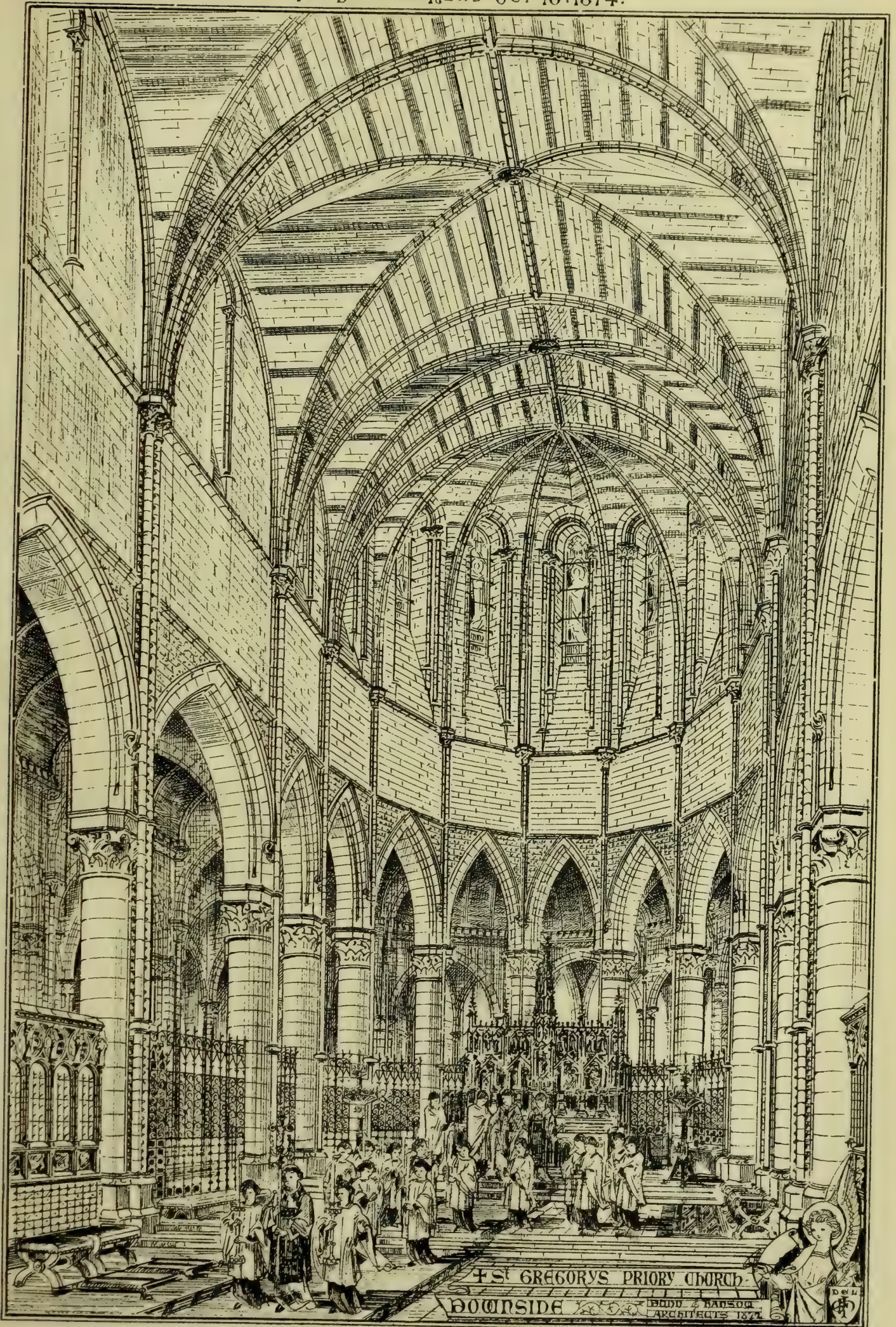


Photo. lithographed & Printed by James Abraham, St. George's Lane Road, W.C.

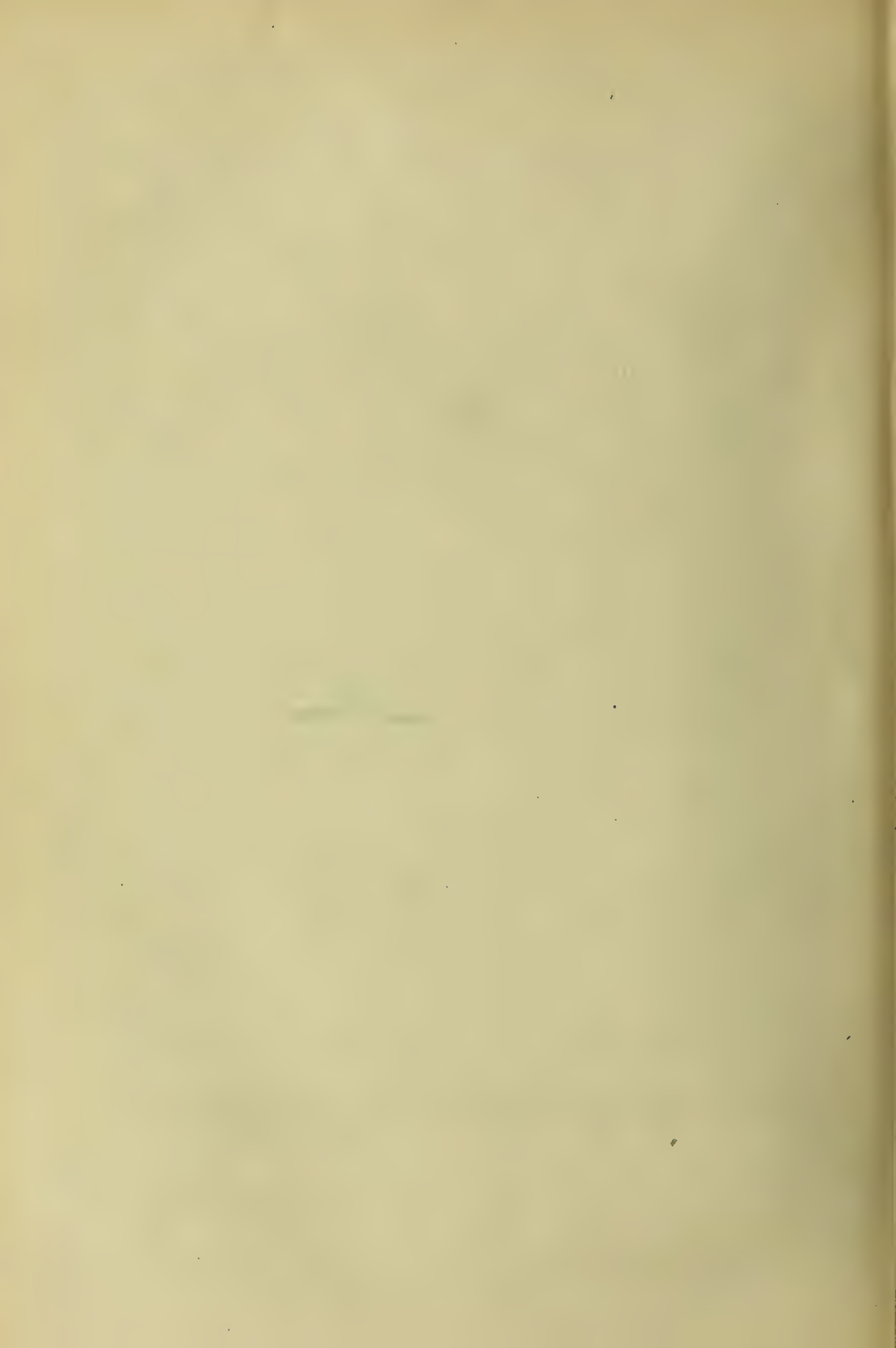














## THE CHURCH CONGRESS AND THE ARRANGEMENT OF CHURCHES.

THE question of the arrangement of churches formed the subject for consideration at the meeting of the Church Congress on Thursday week. The following is a report of the speeches of Mr. Beresford Hope, Mr. G. E. Street, and Professor Donaldson, for the greater part of which we are indebted to the *Guardian*.

The subject was opened by Mr. BERESFORD HOPE, M.P., in the following paper:—

A church is a building in which to do work, and the work to be done in one is to carry out the distinctive worship of the body to which it belongs. Hence the church of every communion, if true to its nature, must vary as the worship of that communion varies. This may seem a truism, but it is worth recollecting in a day when ecclesiastical, like all other art, has to steer its course between the rocks of unreal antiquarianism and an unfettered originality which unkind critics might even call eccentricity. We have in England inherited a priceless treasure of old religious buildings from our Church in its unreformed condition, and as happily the English Reformation involved no breach of continuity—as it purified but did not reconstruct—these churches in the main have served right well for our present use. Still there are those differences between the older and the newer Church of England which ought to make a church provided for this generation something different from one which had been built for the Middle Ages. In the short time at my disposal, I shall endeavour not so much to work these differences out as (having them in view) to offer some hints towards the ideal large town-church of our present age. The large Mediæval church, if true to its own nature, and therefore artistic and successful, was a complex structure, for the ritual for the uses of which it had to serve was itself complex. There were services for the clergy at which the laity were never expected to attend; there were high Masses, and sung Masses, and low Masses, and there were many occasional rites requiring room and special provisions. The aim of the English Reformation was to reduce those services into an order at once simple and congregational, and the modern English church ought therefore to be simple in its plan, and congregational in its working arrangements. When I say congregational, I emphatically do not mean that it is to be all congregation and very little minister—one vast audience and a single stand for a single minister, like Mr. Spurgeon's Tabernacle. I mean just the reverse. I want to absorb as many of the people as I can into a share of the more active work of worship. I want my large choir, and my many volunteer chorists, not only at Matins, and at Evensong, but at the *Ter Sanctus* and the *Gloria in Excelsis*. Attendance at one is no excuse for the neglect of the other. Choral communions, even in cathedrals, used to be unknown, for I do not call that a choral communion when the singing men walk out after the Nicene Creed. Now happily the principle is recognised that the highest art should accompany the highest worship; but from one extreme let us not run into another. In making our Matins and Evensongs congregational, the Church of England has conducted her children into a world of orthodox and Scriptural worship such as the laity of no other Church possess. In our zeal for the Sacraments, let us not lose this treasure; gabbled daily Offices are a disgrace to a priest and people; and a relaxation of the Order, already so liberal in its indulgences, for daily Morning and Evening Prayer, would be a calamity for the whole Church. Therefore, with a great town congregation I must have all done in a building broad and high, as well as long, solid, and dignified in every part. The architect who tries to build up his whole with fragments, who weds himself to some special ancient model, or who has collected together what he thinks a dainty assortment of choice bits, and then endeavours to weave them together, may turn out a museum, but he will never create a temple. I tell the man who wants to build a church which shall at once be useful and beautiful, to forecast it at work—full of worshippers joining in the *Te Deum*—of worshippers upon their knees at the Holy Communion—of worshippers listening to the evening sermon. Thus let him see how his notions of art, his favourite proportions, fit into those practical wants; let him guess, as he only can by such a glance, how every one can hear and every one can see. Let him notice where his light falls and where it is darkness, and, in

particular, let him make sure that the altar and its adjuncts stand well forward, and are not lost in the obscurity of some unlucky shadow. His mind's eye, as well as his natural eye, must be to him a flexible instrument. He must be able to create each situation of worship, to look at it from every point, and to work it out in its sequence, before he binds him to the irrevocable construction.

The church intended to supply the claims of the English use must be broad in proportion to the number for which it is intended; for if the nave be narrow it must also be by so much too long that many will be thrust out of ear-shot and eye-shot of psalm or altar service. There is no reason, beyond the prejudice which such a novelty might excite, why at times one should not construct a circular or a polygonal nave. The Temple Church is precedent enough, and the glorious decagon of St. Gereon, Cologne, would hold a goodly multitude. There are no more congregational naves anywhere than the octagon of Ely and the dome of St. Paul's. Breadth in an oblong church may be reached in more than one way. The simplest is a very wide area and no aisles. I quite accept this plan in its own place. But no one, I hope, would desire to see aisles altogether disused. Where we have them they may either be made proportionally narrow, and rather serve as passages to the wide central area than as substantial worship space; or else the whole broad nave may be constructed of one story, and divided into a centre and aisles by very thin pillars, from which vaulting might spring as in the choir of the Temple Church; or, again (as in the fourteenth century church of the Austin Friars in London, now belonging to the Dutch), these pillars would bear arches, and the space be covered by parallel cradle roofs; for with either roofing arrangement the obstruction might be so slight that the whole nave would be, for sight and sound, as a single apartment.

I have no time to discuss the question of chairs or benches; both are good in their respective ways. Nor can I do more than indicate that in such a church the baptistery should be somewhat emphasised, and that people should not be content with planting down the font in a corner.

Generally speaking, the choir, or chancel proper, ought not to be much elevated above the nave. Practically, the raising of it will be found inconvenient for those hearty congregational services to which I am looking. Artistically, a steep bank of steps at the chancel-arch can seldom be successfully managed; and a more graduated rise will lose space, and thrust the choir too far back. Theoretically, while clerks and chancel should be distinguished from congregation and nave, it is a mistake in principle to make that distinction too pronounced, especially when the stalls will be so largely filled by persons not in orders. For all sound reasons, however, of practice, art, and principle, the great rise ought to be between the chancel and the sanctuary leading up to the altar. Practically this is right, for this elevation compensates for the necessary distance, and places the altar as it ought to be, in full sight of the whole church. Artistically it is right, from the increment of dignity thus bestowed upon the most sacred and important constituent of the building and the worship; and on principle it is right, for it symbolises how far the Holy Communion transcends all other acts of worship.

If, however, the chancel ought to be but very little raised above the nave, still it ought to be clearly distinguished from it, and this distinction the Church of England offers in her ceremonial orders and carries out in her practice. The grandest congregational worship at which I ever remember to have assisted was at the Bissex-centenary of St. Etheldreda in Ely Cathedral, last year, with its vast and well-filled choir and its octagon and nave absolutely teeming with worshippers. Nave and choir there are on an absolute level, but they are parted by a lofty arch and sufficiently open choir screen. I plead for this choir or chancel screen wherever possible. It is ancient, and it also is distinctly and emphatically Anglican. Hooker upholds it, and Cosin explains the words of the Prayer-book, "and the chancels shall remain as they have done in times past," by being "distinguished from the body of the church by a frame of open work, and furnished with a row of chairs or stools on either side." It our own day, too, it has stood a lawsuit, and been signally vindicated. The low screen frequently introduced by our architects into our churches testifies to the principle of order which

the screen embodies, but it is neither so effective nor so consonant with usage. The complaint that a screen is obstructive to sight or sound can only come of one of two causes—the complainant's sense of proportion being deficient, or his having been troubled by some screen designed by a man who labours under the same deficiency. If the upper or traceried portion of the screen is brought so low that it hides the altar from any portion of the congregation, then the work becomes an offence. But this can only arise from blundering. The higher the screen is, the more open it must be practically, for its obstructive elements will be raised above the line of sight.

Breadth is as essential for the chancel as for the nave, for the long, low, narrow chancel of the Middle Ages is antipathetic to that most real and most noble congregational service—

*Dam lecti juvenes Argivæ robura pubis*

throwing off false shame and vesting themselves in the surplice of the customary choirmen, compel their fellow-townsmen to hearty psalmody. I must here suggest a constructional innovation. In our old parochial chancels the side stalls were usually only one deep, and at most composed of two tiers. For the services, such as I wish to see them in towns like this, that allowance will not be enough; there must be provision for three or even four tiers of stalls. Why not? The church, if broad, must also be high. The chancel, as I have contended, must be very little lifted up, so the highest stall will not be so very high; and as the sanctuary must be conspicuously raised, the highest stall need not overtop the altar. With stalls such as these the architect and the carver may revel in bench ends and canopies; without them the church will be overweighted in its race with the concert-hall.

If the stalls are thus arranged in so many tiers on either side an additional reason is provided why the chancel should be broad, for otherwise they would so much encroach upon its area as to leave but a narrow gangway in the middle. Nothing more inconvenient or irreverent can well be conceived than a gangway which gets choked up during a crowded communion. Nor is this the only provision which ought to be made for thronging communicants. There should, if possible, always be means for the descending line of those who have communicated to retire without getting mixed with the advancing line. Where there are no chancel aisles, passages behind the stalls might be built for the purpose.

Again, I repeat, raise well your sanctuary. This is a point on which all Church parties ought to be agreed. Those who attach most honour to the Holy Sacrament should most desire to see the place of its celebration dignified. Those who are most averse to what they think undue mystery should be most urgent that the Lord's table be visible to the entire congregation. This visibility will, of course, be a principal consideration with the architect in calculating the height of the open portion of the screen. This county possesses a signal example of a sanctuary well thrown up in the chapel of St. John's College, Hurstpierpoint. I have no time to offer specific suggestions for the treatment of the altar and its fittings, only I may observe that in a large and popular church the ordinary number of three sedilia is far too few. In All Saints', Margaret-street, this fitting appears in the shape of a stone bench on either side of the sanctuary. If you are called upon to elect between an apse and a square east end, be simply guided by the circumstance of each case, for any attempt to strike an abstract balance must be futile.

Generally, however, I will say that the architect who does not contrive that the altar is the crown of the church, and who does not believe that the holy mysteries celebrated there exceed all other acts of worship—so the altar should exceed all other parts of the church, so the richest resources of art should congregate there, the line of sight from every part of the church converge there—that man has mistaken his craft, and never will succeed in building up a worthy House of God.

Among the practical developments which our own times have seen made in our ordinary system of worship, not the least praiseworthy has been the elasticity which has been given to the use of the Litany. For generations this service had scarcely done more than lengthen the morning devotions by a few minutes. Gradually the separate use of it, with the direct leave of the Ordinary, and then by a general resolution of the Bishops without it, had grown up, and now, by



the recent Act of Uniformity Amendment Act, the permission is made universal, and is being well acted up to. Once a few minutes' episode, or, perhaps, on rare occasions, and in churches which kept up a shadow of week-day worship, a hurried fragment of devotion, it has—with its hymn before it and its hymn after it, and its careful rendering by skilled voices, and, perhaps, the occasional lecture by which it is followed—it has attained the proportions and it excites the interest of a substantial service. We might wisely recognise the change of order by an analogous modification in our churches. In cathedrals the Litany desk has of old been treated as a fixture of good and stately proportions; but there it usually stands within the choir. In parish-churches it is most frequently no more than a movable appendage, which disappears whenever the Litany is not appointed. It might be differently treated in a large church where the building does not gasp for accommodation. The easternmost bay of the nave, or the central crossing where there are transepts, should be left open and unoccupied by sittings. This area would correspond with the soleas of an Eastern church. Then the Litany desk might be permanently placed in this space. The Litany, when two or three clerks sing, is far grander than when it falls to one voice only. Let it, then, be made so as to have sufficient room for two or three clerks. It is usually of wood; wood artistically treated is an excellent material; but marble is still more noble. There is no reason whatever why the Litany desk should not be a permanent ornament of the church, spacious and rich; if of wood, then of wood richly carved; but if of marble, then adorned, it may be, with sculpture, or inlaid of various colours, or bright with the golden sheen of mosaic work. The English rite cannot evoke those aids from art for which the multiplied altars of a foreign church find scope. It ought to discover its own appropriate forms, and among them the large and permanent and ornate Litany desk might be made conspicuous. It would be no merely æsthetic advantage, for if the Litany has moving powers to attune the soul to penitence and trust in God, then the more solemn its recitation is made, the more will its usefulness be advanced.

The Litany desk is not the only ornament of the church which might conveniently stand in this area. Where the church is small the lectern may well be placed in the chancel; but where it is intended for a large congregation, and the choir requires ample stall room, then the Lessons had best be said at the extreme portion of the nave. The Litany desk being in the middle, and the pulpit standing on one side, the lectern would naturally stand on the other, care being taken that sufficient space is reserved between to prevent crowding. Particularly the Litany desk must not be placed so near the screen gates as to present an obstacle to entering or retiring processions.

I have one more development to throw out. Where ground is scarce and dear, and church-goers ought to abound; when, in short, the cry uprises for galleries, why does the architect never give us the galleries of old times? Our galleries are hideous scaffoldings, or clumsy parapetted landing-places. The men who reared our cathedrals devised that mid-height gallery, corresponding with the architecture of the church itself, called the triforium. If you construct triforiums merely to show your cleverness, when you might have put all your people on one level, you waste money on a fancy; but where a gallery is really needed, in which you may dispose your people in decent order, I never yet have understood, and never shall, until I am convinced by the failure of the experiment, why the nave of the new church should not be invested with the beauty and the proportions of an ancient minster by the addition of a practical congregational triforium. The experiment has been tried in a new Roman Catholic Church at Amsterdam, and the effect is telling. Where you have a triforium your altar must be well raised, and your screen just so high that those below may be under and those aloft above its tracery. Since writing this I have been informed that a triforium has also been adopted in the Memorial Church at Cawnpore.

I lay no claims to musical knowledge, and I have therefore on purpose abstained from speculating on the best place for the organ. But I must very earnestly plead that it should form a subject of the architect's mature study, and not be left to the last, or handed over to the organ-builder to settle. With a large choir and a lofty chancel it might, I should think, with

advantage, both to sound and to the appearance of the church, project out over the stalls on one or both sides.

Time warns me to conclude. I shall only add that if our architects will in each case work for its circumstances; if they will throw themselves upon the resources of that common sense which they so abundantly possess, as well as of their artistic perception of beauty; if they will reverse exactly the uses for which they are building their churches, and then only think out the material forms in which those well-understood uses may be embodied, and, having settled the general outline, afterwards clothe it upon graceful proportions and details of beauty, they may become the authors of buildings which will be an honour to those who produced them, and a delight to them who come after.

Mr. G. E. STREET, R.A., also read the following paper:—

The subject on which I am asked to read to this meeting is too large, too difficult to be discussed in twenty minutes. In so short a time you must excuse me if I confine myself to stating briefly the conclusions to which a life of work on the subject in question has brought me. It is impossible both to state them and defend them. What then, are "the wants of the times" to which our churches and our services require adaptation? There are those of religious people who do not require to be taught that it is a duty to worship God. Those of the still religious people who regard churches mainly as places of meeting, and those of the people who feel no interest in religious worship, do not care to go to church, and if asked their opinion do not care whether they have a church to go to or not. It is with this last class, dwelling chiefly in large towns, that I think we are most concerned. We want to win back those who have altogether left us; and in so doing, we may perhaps do something for those who still remain. The first thing wanting in this country seems to me to be the realisation of worship in the highest sense of the word. Churches built originally because men wished to prostrate themselves before their God, and to offer Him their best and most precious gifts, had come too often to be regarded chiefly in reference to their area, and the possible number of seats which can be crowded round their pulpit. In short, man had usurped the place of God. The result was, as we know, that men's private interests were thought of most of all. So pews were built; a few usurped the rights of all, and selfishness being predominant, the altar and the chancel were laid waste—first, the altar services were omitted, next the daily services, and so at last we have come to see that the times had wants which in most places neither buildings nor services satisfied. I believe that the most thorough restoration of the more ancient fabrics of the Church to very nearly their original condition is one of our first wants. I do not mean to the state of cold decency which marks so many well-meant works of restoration, but to a state consistent with that costly spirit of sacrifice which marked the men whose works we all admire. It was not the "nicely calculated less or more" that built such a cathedral as Ely. And it is where the enthusiasm of men is stirred that works conceived in their degree in the same spirit as that are still successfully prosecuted.

The crying want of the day in England is a conviction that worship must be offered; that it cannot worthily be offered save with our very best; and that the highest service of the church being clearly that which brings us most directly to habits of worship is that which, above all others, should be elevated in its accessories, and frequent in its celebration, instead of being, as now, almost always the least adorned by art, and the least often brought before us.

I desire to advocate nothing beyond what a fair and liberal interpretation of the Prayer-book will give us; but I maintain that the liberality ought to be in the direction of more ornament, more ritual, more stateliness in our churches and their services, rather than in the direction of less of all these. It is the absence of them which has driven away so many of our people and diminished the zeal of others; and many of us know the happy results of their restoration wherever it has been accomplished.

Let us now see what adaptations of the fabric of our old churches are really required. They were built for services different only in detail from ours. Their great object was the celebration of the Eucharist. The whole provision was for this mainly; and all other wants were acces-

sories. And scarcely a single change is required to adapt them for our Offices—which, as we all know, are closely copied from the ancient uses.

Take our cathedrals first. These have been less altered than any in Christendom. To them we owe the preservation, during the darkest period, of services and ceremonies which might otherwise have become extinct. How great a debt this! yet their use might often be improved. They have existed only for choir services. Their chapels are unused, their stalls occupied by any one, and their choirs polluted by the intrusion of pews and seats from screen to altar; whilst it is but very lately that some of their naves have been used even for sermons. A better adaptation of their magnificent interiors to the wants of the day would involve the removal of all modern pews and seats from the choir, the separation of the clergy from the laity by removing the close screens which so often divide naves from choirs, and the erection of open screens in their place, and would exalt as much as possible the service of Holy Communion, so that service and building might harmonise. The removal of the close screen is the one serious alteration of the fabric ever required. Whilst it stands, see what shifts and contrivances men make in order to substitute some other plan for the use of the nave! Thus in some cathedrals one hears of choir aisles, which were meant for processions or for altars, being seated for congregations. So to avoid the assumed iniquity of removing (not destroying) an old close screen, naves are not used, choir aisles, which were not meant for seats, are seated and opened to choirs, and choirs—meant only for a few leaders of the service—are crowded from door to altar with people, some looking north and south, some west, and few, if any, towards the altar; whilst, in order to make more space, many of our cathedrals—as Bristol, Ripon, and York—have had their altars and altar-screens moved eastward.

Surely, even for special services in the nave, that service is most natural and most edifying which is said before the altar. And it is seldom wrong while to have two distinct and separate arrangements for services in the nave and in the choir, as at Westminster Abbey, at York, and elsewhere. They spoil the effect of the churches, and are in no way impressive.

Then, again, why should we not more often use the aisles of a cathedral for processions? The whole building is conceived in an æsthetic spirit. Let us make the most of it. We know how much mystery, how much religious charm, how much spiritual influence the mere intricacy of plan and detail has for us. We know how infinitely solemn are the effects of sound in such places. Who has not been moved by the singular solemnity of chanted processional psalms at the consecration of churchyards, half heard by the congregation waiting inside, whilst the Bishop and choir make the circuit of the church before entering. Remembering such effects, why do not our cathedral aisles more often echo the processional hymn and chant as of old? That which is right and edifying at a choir festival or a consecration may surely be right at other seasons also.

Then, again, as cathedrals were built for daily celebration of Holy Communion, and as the Prayer-book distinctly contemplates such a use for them still, why should it not be restored whilst meaning might be given to, and uses found for, some disused chapels, if at other hours than those of the choir services these, too, were utilised for the same service without musical adjuncts?

Again, it would be a reasonable thing, and I believe a wise one, to allow and encourage the formation of guilds of various sorts, one of whose customs might be the recital of their prayers or their litany in some side chapel or aisle. Those who have seen religious foreigners using their churches in this way without clerical aid may feel surprised that in England only such a license is deemed intolerable. And it may well be asked whether, if it were granted, we should not have more worshippers and fewer Dissenters? For the use of worshippers in a church of grand proportions, the only seat required and allowable is the movable chair, to be stacked on one side when not in use: chairs tied together, or light benches of deal, or handsome seats of oak, equally spoil the architectural effect of the unencumbered floor. And a congregation of fifty or one hundred is frozen by permanent preparations for one or two thousand. But some chairs should be left for private use, and they should always be or be accompanied by, kneeling chairs. It is sad to see how multitudes of us pass through a cathedral as



if it were a museum, without evident thought of the object of the place, mainly, I believe, because the guardians of the church make no provision for any but public use, and because we are too shy to use it without such provision. Time warns me that I must say no more about cathedrals and their uses, as it is necessary to consider for a few minutes the case of our parish churches, and their adaptation to the special wants of the times. This is a part of my subject on which there may perhaps be even a more general agreement than there is on the subject of cathedrals. Churches must, first of all, be arranged with a view to the glory and honour of the service of God rather than the mere comfort of the worshipper. It is the difference between these views which makes the great distinction between all old churches and most new ones. Even now, very many churches are still built and restored with only too evident a forgetfulness of their real object and that real want of the times which has already been indicated.

The churches with which we have now to deal are of various ages, and built, as has been seen, with various objects. It is for us to restore them all as far as possible upon one system, and this the most edifying that we can devise.

Our Mediæval churches do not, as a rule, require much more than that men should restore them exactly to the state in which they were left by their builders, if that is possible. Most of us agree on this, with the exception of some debatable points, on which a few words may suffice. First among these is the high screen between the nave and the chancel. I have already said that in cathedrals the dividing screen ought to be removed whenever it prevents the reverent combined use of the nave and choir. But these cathedral screens are solid and massive erections, non-transparent, and real hindrances to the edification of the congregation. This can rarely, if ever, be said of the old open chancel screens in parish-churches. A service said or sung behind them can always be perfectly well heard by the whole of the congregation. They are useful æsthetically, as lending an air of mystery to the chancel; and, finally, they are among the most beautiful objects of church furniture left to us, and at the same time so characteristic of our national architecture as to be doubly dear to those who hold it in highest esteem. May I not hope to carry some with me when I assert that the restoration of the old lofts on the top of these screens would be as useful as it would be ornamental? Why not again use them for the Epistle and Gospel? Why not for singing those solemn and now frequent Good Friday services, which would gain in impressiveness by the very novelty of the place from which they were said?—for here it may be said that under proper restrictions some variety of character in our functions is one of our great wants, and any old feature which involves it may well and wisely be restored. Another difficulty in old churches is their frequently inconvenient shape. The commonest example is, that of the cruciform church, with large piers supporting a central tower, and obstructing both sight and sound between chancel and nave. Here what is just bearable in one church may be intolerable in another. In a small church, though one would wish the arches wider and the piers smaller, it is generally possible to hear in any part, and so the inconvenience is not great. But there are cases in much larger churches, in which it is really impossible to get over the difficulty without a departure from our ordinary arrangements. Where the chancel is large, but cut off from the nave by small tower arches and large piers, it is a good plan to use the chancel altar for important services (where, with the assistance of the choir, the service may be heard), and to provide a second altar in the nave, in a side chapel, or in a transept, where the early celebrations of Holy Communion may be had, with the advantage to communicants of being gathered near the altar, and being able to see as well as to hear. A third alternative, which is sometimes necessary, is the arrangement of an altar and choir seats at the east end of the nave, or under the central tower for the principal services, and of the old altar in the chancel for the low or daily Offices. Whilst it is impossible to deny that cases may arise in which the removal of the central tower is the only possible plan for making the church really do its work. In such cases, Mediæval architects did not hesitate to sacrifice antiquity to convenience, and in extreme cases we must do the same, though never without the gravest consideration.

Wherever placed, the altar should be protected

by gates in the screens, not only at the west, but also at the sides of the choir or chancel. One of the wants of the times is certainly the habit of private prayer in our churches. Our people, overcrowded and confined in their homes, have only too many inducements to forget the duty of prayer, and our churches are, in spite of years of discussion, almost invariably locked up, so that they cannot be used save during time of public worship. The screened chancel is a necessity where the church is always open. I doubt not that every Bishop, from Bishop Blomfield's time to the present, has expressed his approval of the open church for private prayer; and in so doing they have given incidentally their approval of much more. There must, first of all, be something attractive in the building, and when the intending worshipper is attracted and enters the building, it is essential that he should find it possible to use it. How will such an one feel, think you, if on entering he find the best part of the church full of appropriated seats? Will he not retreat for fear of intruding even in the absence of the owners? And can we blame him? So long, indeed, as we tolerate any such system as that of pews, we may despair of private prayer in our churches; and the sooner, therefore, the system is abolished, the sooner will the habits of our people become more thoroughly religious.

It is fortunate for us that from the time of the Reformation until about 1830 but little was done in the way of building new churches. Those which were built were mainly in towns, and as a rule the floors of most of them may, without any violence to architectural features, be converted in an impressive and useful manner. What is wanted in them is usually a place for the choir and altar, which may be formed by either low or high screens, open seats in place of pews, and the removal of their galleries. The last point is of importance, because, though under certain conditions a gallery may very well be constructed, unfortunately almost all of those which have been put up in our churches for the last two hundred years have been erected with a view to the pulpit, and the pulpit only. They always convert a church into a sort of auditorium, and give no suggestion of it as a place for worship. And if they are really desirable and proper in a church, it would seem only reasonable to have tiers of them arranged round the pulpit instead of only one, and to design our churches on wholly new lines.

In our new churches it is much more open to us to adopt such special developments as may seem most likely to win the masses to habits of worshipping in them. For this object our way of subdividing parishes into districts, each with a small church, does not seem to be the best. In large churches the senses are more rarely impressed; it is more possible to have fine and stately services; there may be more clergy and greater variety of preaching and teaching, and the whole fabric and work is much more likely to be attractive than it is where less magnificence is possible. Then, where funds allow, I would always counsel that as much space as possible should be given in the nave, in full sight of chancel and altar. Here it is very easy to improve much upon the ordinary plans of our old churches. They satisfied the people by giving them a number of altars to worship at. Whilst we have to take care that as many as possible of our people shall be able to see the one altar, even when, as is sometimes convenient, a second is provided in large churches for early celebrations. For this purpose plans like the following may be suggested:—A broad nave with narrow aisles, with an apsidal east end, out of one side of which the chancel may open. Thus, great spaciousness in the nave may be combined with sufficient width in the chancel, or the chancel may be brought forward into the nave, so as to place the choir stalls in the centre of the people, from whom they may be divided by low screens; or, taking a hint from the very oldest church arrangements, we may place the choir entirely among the people, and read the Lessons, Epistle, and Gospel, and preach, from ambons at the sides of the choir; or, adopting the Domical plan for our nave, we may gather all the people round pulpit or altar, as the case may require. All such developments should be such as arise from the requirements of convenience and impressiveness in the interior. It is this—not the exterior, which is to do the important work of moulding the religion of our people. Few have ever become better for looking at a lovely spire, whilst thousands owe their deepest religious impressions to the effects, partly architectural, but, nevertheless, wholly religious, of noble interiors.

If bald and unmeaning fabrics were likely to meet, or had met, the real wants of the day; if few and frigid services, such as we have too often to put up with, were really successful in keeping all the people of England within the fold of her Church, it would not have been deemed necessary to ask for the consideration of the subject now at this congress. It is because these have failed to some extent, that we are taking counsel. We must make some change, and I maintain that the only profitable change will be in the direction of nobler structures, and more ornate as well as more frequent services. We must break down entirely and thoroughly the respect of persons symbolised by the pew system; we must leave our churches open persistently till people become used to the custom and use them; we must provide the proper appliances for their use; we must not allow obsolete architectural features (as, for instance, close choir screens) to stand in the way of the religious use of our buildings; we must make the Communion Office more and more the chief of our functions; we must imitate the great preaching orders of the Middle Ages by building capacious naves for the convenience of those who will come to hear sermons; and emulate the religious zeal of those who made it their chief object in so many other churches to decorate and beautify the altar and the font. We may then, perhaps, attract some of these to our free, open, and beautiful interiors who hitherto have not come because they could plainly see that they were not welcome, and once within the walls, we may trust that their feelings will be sufficiently awakened to bring them there again and again.

All that I advocate may be accomplished without any meretricious gaudiness. The simple solemnity of the Cistercians may, if we choose, be our model. They were in a sense the Puritans of the thirteenth century, but the living reality of their faith made it impossible for them to build otherwise than impressively. Let us, at any rate, emulate the manly solidity of all their works. Our churches to be cheerful must be amply lighted. Then they may, if we will, be decorated with colour on walls and in windows with the best result. But I think that as far as architects are concerned their main duty now is to give more freshness to their ground-plans than is commonly attempted. In doing this they must recollect that the ample and dignified chancel, the due provision of space for the font, the proper and ample arrangements of the vestries for clergy and choir, are all to be as much thought of as the accommodation of the people, and if it is said that these ideas are costly and extravagant, they can but reply that the country and the Church are not poorer now than they were from the twelfth to the fifteenth century, when all these arrangements were carried out with but little thought, if any, of their cost.

Professor DONALDSON said: I am very glad that a very short space of time is allotted to me, for I have very little to say, and shall confine myself to one division of the subject, "the structural fabric"—treating on the externals as an architect. I heard with much interest the able papers of Mr. B. Hope and of Mr. Street, both of them interesting and instructive. But Mr. Hope, in treating of the parts of a church, omitted one material object, the Lord's table, which I find to be an essential portion in the Communion Service; and he substituted for it the altar, which is not found in the Prayer-book. Which is the most consistent with the sacredness of the Communion Service, the *Table of the Lord* or the *Altar of the Saint*? I have a meaning in this distinction, for there is no altar proper but in the Roman Catholic Church, where no altar is raised but over the relic of some Saint. Now as to the decoration of the altar. I should have thought its very purpose sufficient to the devout mind to give it dignity and attraction. But now there is the custom of backing it with a reredos, filled with sculptures, calculated to excite superstitious worship, and this we see in foreign churches. We know that such are forbidden in the Homilies, and St. Bernard, as Mr. Street observed, forbade the use of such decorations in the Cistercian Churches, so thoroughly conscious was he of their idolatrous tendency. There is another embellishment proposed for the altar, that is the baldacchino, as advocated by Mr. Longman, in his volume on St. Paul's Cathedral, London, in allusion to the proposed decorations there. The truth is that Sir Christopher Wren never mentions the word baldacchino, the only illustration of which accompaniment remaining is an architectural mural backing, like those behind the side altars in Roman Catholic churches, as



observable in his drawings, and in a questionable model in St. Paul's, much mutilated, and of uncertain date. The baldacchino has recently been condemned as illegal in the Ecclesiastical Courts. It has been observed that hitherto the part least adorned in our churches has been the altar. But how inferior is any sensuous impression of the Lord's table to the innate sacredness of the solemn rite? I have but one word more to add. Allusion has been made to low and daily services of the Holy Sacrament. Can there be any degree of holiness in the administration? Is one class to be slightly revered by being subordinatedly administered in the side aisle and another in the chancel? Can we so trifle with sacred things? There can be but one altar in a church, not two altars!

#### ARCHÆOLOGICAL.

**A RELIC OF THE MOUND BUILDERS.**—Dr. H. H. Hill, one of the most enthusiastic and successful collectors of American relics, on a late excursion to Ironton, according to the *Iron Age*, discovered the great sandstone anvil of these wonderful people. It was found about two miles above Ironton, on the farm of Mr. Luke Lelly. It is composed of very sharp grit, contains over 100 depressions, weighs about 500lb., and measures 8ft. 8in. at its greatest circumference. It will be placed in the rooms of the Cincinnati Society of Natural History, to which society the doctor proposes to present it.

**DISCOVERY OF A ROMAN STATUE IN CRETE.**—An interesting discovery is reported to have been made lately under one of the mounds which cover the site of the ancient city of Cnossus in Crete. A colossal statue of a warrior, with sculptured breastplate, but without the head, and with arms and legs broken, was dug up. The figures of the breastplate are said to bear evidence of Roman workmanship, and the statue is supposed by connoisseurs in the island to represent Metellus, the Roman conqueror of Crete. It is further said to bear a striking resemblance to a statue in rather better preservation, which is now in the Museum of St. Irené, and was also discovered in Crete on the site of Ierapata, a town which was sacked and destroyed by Metellus.

**LEICESTERSHIRE ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETY.**—At a meeting of this Society, held on Monday fortnight, Mr. A. Paget exhibited several fragments of Roman pottery imitation of Samian ware, apparently Caistor. Part of a potter's mark was visible on one piece, and many of them were highly ornamented with figures; also several fragments of Roman urns. Mr. Paget also exhibited some very interesting fragments of a Roman glass drinking-cup, ornamented with figures of gladiators in relief, with inscriptions over the figures, being the names of the gladiators, but which were not completely deciphered. All these fragments were discovered in making excavations on premises belonging to Mr. Fielding Johnson, in North Bond-street.—The Rev. A. M. Rendell exhibited the original seal, an impression from which he produced at the last meeting. It was of cast brass; the matrix a double-headed spread eagle rudely designed. It was conjectured to be an attorney's common seal of the seventeenth century.—Mr. G. N. Nevison exhibited the bowl of a pipe cut out of solid stone, apparently green basalt, supposed to be of Indian manufacture.—Mr. G. C. Bellairs read a paper on "Trinity Hospital," being an enlargement upon his remarks when describing the building at the late general meeting.

Gypsum mixed with four per cent. of powdered marsh mallow root, according to the *Garden*, will harden in about one hour, and can then be sawn or turned, and made into dominoes, dice, &c. With eight per cent. of marsh mallow, the hardness of the mass is increased, and it can be rolled out into thin plates, and painted or polished. This idea might prove useful in connection with the manufacture of ceiling enrichments and other plaster decorations.

The Midland Railway Company deserves the gratitude of the public for its successful introduction of the system of fast third-class trains, in which it has been since followed by the other companies. It is now about to do away with the "second class" carriages on its lines. From the 1st of January next, all trains will be composed of what are now styled first-class and third-class. The rates of passenger fares will, from that date, be 1½d. per mile for first-class, and 1d. per mile for third-class.

A new Wesleyan chapel was opened at Oakridge, near Bristol, on Thursday week.

## Building Intelligence.

#### CHURCHES AND CHAPELS.

**COLCHESTER.**—The Church of St. Nicholas, Colchester, is about to be restored and enlarged, from designs by Sir Gilbert Scott. The structure will be extended southwards and eastwards, the south aisle wall will be taken down (this is already done), and a new nave of much greater width than the present, with a south aisle, will be built. The present nave is to become the north aisle to the new nave, and the nave and aisles will be the full length of the nave and chancel together of the old church, the new chancel being wholly beyond the former line of the structure. There will also be a south aisle to the chancel, and a porch on the south side. A doorway will be inserted in the tower, and be made to serve as a north porch. The present north aisle will be screened off for use as a room for parish meetings. The style of the new structure will be Decorated, that being the character of the greater part of the old building. The eastern end of the church will show a gabled chancel, having rich traceried parapets with pinnacles at the angles. The nave will have plain parapets at the sides, but the gables will have tracery somewhat like that of the chancel. The walls will be faced with Kentish Rag stone, the dressing being from the Box Quarries, near Bath. The dimensions are as follows:—Length of nave, 76ft.; width between walls, 62ft. 6in.; height to top of wall, 34ft.; height to ridge of roof, 54ft.; length of chancel, 31ft.; width, 22ft.; height to top of walls, 24ft.; height to ridge, 42ft.; extreme length of church, 114ft.; extreme width of church, 82ft. The contractor for the whole of the works is Mr. Dobson, of Colchester, and the clerk of the works Mr. James Burlison.

**DEWSBURY.**—On Tuesday the first stone of a Methodist chapel at Dewsbury Moor was laid. The chapel, which is from designs by Messrs. Holton and Cannon, architects, Dewsbury, is to be in the Early Geometrical style. The building is to be erected of delph stone, the internal walls being plastered. Accommodation is to be provided for 460 worshippers, without galleries. The cost, exclusive of site, boundary walls, &c., will be about £2,600.

**GATESHEAD.**—A new Wesleyan Chapel at Bensham, Gateshead, was opened last week. The style is Italian. The main building is a parallelogram 70ft. long by 46ft. wide, and having a height from floor to ceiling of 32ft., inside measurements. Galleries are carried round three sides of the interior, stopping against the north wall; between them is the orchestra, which projects 20ft. beyond the line of chapel. Sitting accommodation, allowing 28in. to each person, is provided for upwards of 800 adults, at a cost of about £6,000. The woodwork of the pews, gallery front, pulpit platform, &c., is all of pitch-pine, simply varnished, and the whole has a light, warm appearance. The beams of the roof, resting upon curved braces carried by carved stone corbels, also form a pleasing feature, at the same time giving an appearance of great strength. A margin of stained glass is introduced round all the windows with good effect. The building has been completed by the contractor, Mr. Joseph Elliot, of North Shields, from the designs of the architect, Mr. F. R. N. Haswell, of North Shields, Mr. Wilford being clerk of the works.

**LIVERPOOL.**—On Wednesday week the memorial-stone of a new Wesleyan Chapel was laid at Aigburth Vale, Liverpool. The building will provide accommodation for 250 persons. The style will be Gothic; the fittings being of pine, with an open-timbered roof; and the chapel will be built of brick, with white stone dressings and coloured brick bands. The cost is estimated at £1,000, exclusive of land. Mr. C. O. Ellison is the architect, and Mr. Richard Stananought the contractor for the work.

**LIVERPOOL.**—In 1871 a small church was erected by the Congregational body of Liverpool in the suburb of Walton Park. The edifice, which contained 200 sittings, was designed by Mr. H. H. Vale in the Early English style. It has become necessary to add a new wing of equal size with the original building, to which it stands at right angles, the whole consisting of a nave 70ft. by 25ft., with two transepts 25ft. by 10ft., arranged to accommodate 350 persons. The new

wing is constructed of picked grey brick, with patent pressed red and blue band courses, &c., and yellow Stourton stone dressings. The enlargement has been carried out according to the designs, and under the superintendence, of Mr. Thomas Cook, architect, of Liverpool, by Messrs. W. and G. Johnson, builders, of Seaforth.

**OSWESTRY.**—The parish-church of Oswestry was reopened on Tuesday, after restoration by Mr. G. E. Street, R.A. The interior was in a very bad condition, and it was necessary to take down nearly all the columns and arches, and to rearrange their lines. The new exterior features are—on the north side a partially renewed transept gable with a pointed window filled with tracery, in place of the old circular-headed window. The aisle windows are simply renewed in the old style. The west front shows a new doorway into the nave, surmounted by a new west window. The most noticeable improvement in this front is the altered proportion of the nave and aisles, caused by the widening and raising of the former, and the general alteration of the pitch of the roofs. On the south side are two new gable windows filled with tracery, and on this side a stone porch has been built. On its outer archway are three niches containing figures of Our Lord, St. Mary, and St. Oswald. The east front is strictly preserved, with the exception of repairs and finishing of gables surmounted by stone finials; it has only one new window replacing the street door originally existing. The internal dimensions are about 142ft. from east to west, and nearly 100 from north to south. The church will be seated for 1,200 worshippers. The cost has been nearly £10,000. Mr. Yates, of Shifnal, Salop, was the builder, and Mr. Chapelow the clerk of works.

**SOUTH NORWOOD.**—The plans of Mr. Alex. Launder, architect, of Barnstaple and London, for a Wesleyan chapel and schoolrooms here were selected in a limited competition. The tender of Mr. Smith, builder, of South Norwood, has been accepted, and a contract entered into for the sum of £4,620. The foundation-stone of the schoolroom was laid in September by Mr. T. Matthews, of Shooter's-hill. The memorial-stones of the church were laid on Wednesday, October 14, 1874, by Messrs. R. Waterman, of Croydon; W. W. Baynes, of West Croydon; T. R. Crowle, of Kensington; and J. Marsden, of Bolton. This is one of the churches inaugurated by the Lycett Provincial and Metropolitan Church Building Fund, and is intended to seat 1,020 persons. The premises comprise the chapel, a large schoolroom, four convenient vestries, and a minister's vestry. It will be built in bricks, with freestone and other dressings. The clerk of the works is Mr. R. Gribble, of Barnstaple.

#### BUILDINGS.

**HEREFORD.**—The new Museum and Free Library, Hereford, was opened on Thursday week. The style of the building is Venetian Gothic. An arcade of five arches occupies the entire ground-floor frontage of the building. The reading-room and library occupy a large building at the back of the main block fronting Broad-street, and separated from it by the staircase hall, the size of each room being about 80ft. by 30ft. The building generally is built of brick and stone, the front being entirely of stone, selected of different colours. The walling is a blueish-grey stone; dressings generally a light brown Campden stone; the four columns on the ground-floor are of Radyr stone. The architect is Mr. Frederick Kempson, F.R.I.B.A. Mr. James Bowers was the contractor.

**KING'S COLLEGE.**—The Governors of this College have during the recess provided much extra accommodation for their students. A new wing, one story high, in a similar style of architecture with Somerset House, and fronting the Thames Embankment, has been added to the present building. It is built of Portland stone, and lighted by seven windows, surmounted in the centre by a carved stone escutcheon, bearing the arms of the college and the motto "Sancte et sapienter." In the rear the dissecting-room and laboratory are considerably enlarged, and new consulting-rooms and offices are erected. The students' rooms have undergone material alteration and improvement, and a new drawing-school is nearly completed.

**THE NEW CITY POLICE-STATION.**—The new City Police-station about to be constructed by the Corporation in Bride-lane, Fleet-street, will be erected on a portion of one of the oldest historical sites in the City of London. The Saxon kings built a palace here before the Conquest, on the



remains of a building supposed to be of Roman origin, and Henry VIII. erected a stately and beautiful house, and called it Bridewell, from a celebrated well near Bride church. King Edward VI. granted the site to the City for a workhouse for the poor, and a house of correction for sturdy rogues. The proposed police-station will only provide accommodation for a limited number of prisoners, certainly not so many as the old prison, which contained, in 1842, 1,324 persons, including 466 various thieves. The name of Bridewell Police-station will probably be retained for the new building. The old prison, erected about 1560, and demolished in 1862, having been the first of its kind, all other buildings constructed on the same principle have been called Bridewell.

**THE NEW JUNIOR NAVAL AND MILITARY CLUB.**—The erection of the New Junior Naval and Military Club in Pall-mall is being rapidly pushed forward. The building, which is six stories in height, terminating with a zinc-covered turret, has a frontage of 40ft. in Pall-mall, and is built entirely of Portland stone. The base and columns of the entrance are of polished Aberdeen granite, and over the doorway are two life-size recumbent female figures supporting shields bearing medallions of Nelson and Wellington. A notable feature in the building is the introduction in the rear of the fourth floor of a roof or flat, extending out some distance, and overlooking the grounds of Marlborough House. This will be paved with encaustic tiles, and in the summer it is proposed to erect a tent and utilise it as a lounge. The plans have been prepared by Mr. Dudley, and the works, under the supervision of Mr. A. Thorpe, are being carried out by Messrs. Bywater.

**READING.**—The foundation-stone of the new municipal buildings at Reading was laid on Thursday week. Mr. Alfred Waterhouse is the architect. The style will be Gothic, and the buildings will be of local grey brick, with red brick dressings, relieved with red terra-cotta from the neighbourhood of Norwich. There will be no stonework whatever in the buildings. The principal feature in the structure will be the entrance-tower, which will supersede the present entrance to the Town-hall. It will be 60ft. high to the top of the cornice, and 100ft. to the finials. The council-chamber will be 36ft. long by 25ft. and 24ft. high, with a carved ceiling. In this room there will be a spacious gallery for the public, the dimensions being 37ft. by 12ft. deep. The old council-chamber has been shortened, and will be used as a committee-room. The roof of the building will be high-pitched, and covered with tiles. The total cost is £8,465. Messrs. Parnell and Sons, of Rugby, are the contractors, and Mr. Bottrell clerk of the works. The new buildings will be completed by January, 1876.

**WELSHPOOL.**—The new Powisland Museum and Library at Welshpool was opened on Monday week, and consists of a wide entrance-porch leading into the museum, 42ft. long by 26ft. wide, and 27ft. in height. The exterior of the building is Gothic in style, and built entirely of light yellow brick, the cornices and other features being of moulded brick. The works have been carried out under the superintendence of David Walker, Esq., the honorary architect, by Mr. Edward Williams, builder, of Newtown, and the total cost, exclusive of fittings, will amount to about £480.

**ACTIVITY IN THE BUILDING TRADE OF BRUSSELS.**—A large amount of work is at present in course of execution in the Belgian capital. A new boulevard has been laid out running in a direct line from the Station du Midi to the Station du Nord, completely across the city. The bricks used in Brussels are red, very soft, untrue to shape, and rather smaller than English bricks, and are rarely used for face-work. Many of the new buildings have dressings of grey granite, others a mixture of stone and granite, with the wall space of ashlar, or bricks covered with cement, and in a few instances the bricks exposed. Some few fronts are entirely of stone. The designs generally are similar to those in vogue in France, with a tendency to greater projection of cornices, balconies, consoles, &c., and rather wanting the refinement of the French work in the details. On some of the roofs zinc is being used. The new Bourse is a fine building, and worth more than a passing notice. The restoration of the old church of SS. Michele et Gudule, the cathedral of Brussels, is progressing; and the restoration of the front of the Hotel de Ville has proceeded over more than half the facade, including the tower.

#### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

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E. A. AULD (Drawings to hand).—E. F. (Drawing to hand not suitable).—PUNCH BOWL (Bickers and Son, of Leicester-square, have published a book—Chaffers on Old China).—S. T. (There is no architectural paper that we know of in America worthy of the name).—ZULU (Ask some definite question about the interior of St. Paul's, and probably you will get a definite reply).—PENCIL (There is a register of vacancies at the Architectural Association, 9, Conduit-street).—J. LOWE (To hand).—T. RAFFLES DAVIDSON (To hand).—JAS. CUBITT (Detail drawings to hand).—W. H. T. (Yes).

### Correspondence.

#### "WORKING-CLASS DWELLINGS AND MODEL LODGING-HOUSES."

(To the Editor of the BUILDING NEWS.)

SIR,—I venture to affirm that Dr. Meymott Tidy's condemnation of the large blocks of improved dwellings for the working classes which have lately been erected, or which are now in course of erection, in the more densely-populated parts of London, is far too sweeping (see paragraph with the above title on p. 449 of the last number of the BUILDING NEWS). Undoubtedly, there have been great mistakes made in the planning of some of these blocks of buildings, and every one who has considered the question will agree with Dr. Tidy that "long, dark passages, with rooms on each side, like so many horse-stalls in a nobleman's stable, tenanted by different families," is far from being the best arrangement for securing privacy and sanitary efficiency. But this mode of planning is not likely to be imitated; indeed, it has already given way to a far superior type of plan, which is to be seen in the five large blocks of buildings known as "Farringdon-road Buildings," recently erected in Farringdon-road by the Metropolitan Association for Improving the Dwellings of the Industrious Classes. Each of these blocks is oblong in shape, but, in fact, is divided into two square blocks by a party-wall in the centre of the oblong block. Each of these square half-blocks has its own staircase, with a landing running right across each floor, and open to the atmosphere on each side for the whole height of each story, an iron railing running along the outer edges of the landing to prevent people from falling over. These landings and staircases are thus virtually in the open air, and there being a constant draught across the landings, there is as little danger of effluvia being conveyed from one tenement to the other as there would be in the case of ordinary dwellings whose street-doors adjoin each other. These buildings are well worth a visit by architects and others. Each of the large blocks

contains seven floors, viz., sub-basement (partly used as dwellings and partly as cellars to the shops on the ground-floor frontage), ground-floor (including shops on ground level and dwellings raised about 3ft. or 4ft. above ground line), and five stories above. In the four corners of the landings of each staircase are the street-doors (for such they are in reality) of the tenements, there being four tenements on each floor. These doors each give access to a short passage, corresponding to the hall or passage of an ordinary house, and from this passage doors open right and left and at the end into the various rooms included in the tenement. Each tenement includes living-room (with oven, &c.), two bedrooms, and scullery (with sink, constant supply of water, copper, large cupboard, coal-bin, and small open fireplace for cooking, heating irons, &c.) The utmost comfort is obtained in a very compact space, and privacy is secured not only by means of the passage referred to, but by iron gates on the landings, and by the street-doors of each tenement being opposite to, and not adjoining, each other. The roofs are flat and covered with asphalt, and are used by the tenants for drying clothes, beating carpets, &c., special provision being made for these purposes. A good wide strip of space is left between each block. These buildings are, to my personal knowledge, highly appreciated by the tenants, and as the Association pays a dividend of 5½ per cent, it is more than likely that other blocks of buildings of a similar character will be erected.—I am, Sir, &c.,

DELTA.

#### ECONOMY OF USING BELGIAN IRON IN BUILDING OPERATIONS.

SIR,—An important fact has been established in Sheffield, as illustrating the economy of using iron imported from Belgium in the completion of building operations. In the High or Angel-street of that town Messrs. T. B. and W. Cockayne are erecting immense premises as a drapery establishment. The contracts for the building alone amount to £20,000, and another £20,000 has been devoted to the purchase of the area, with some property previously standing upon it. Mr. Bissett is the principal contractor, and having to use many wrought-iron girders, joists, &c., he sent to both English and Belgian makers for estimates. Singular to state, Mr. Bissett found that the prices charged by the Belgian houses were no less than 20 per cent. below those of the English. Mr. Bissett's order amounting to £5,000, he thus saw a clear saving of £1,000, and he subsequently closed a bargain with the Belgian makers. We should state that Mr. Bissett obtained his prices before sending in his estimate for the building work, and it is mainly to the saving he thus effected that he considers he was successful in obtaining the contract. The estimates of the English makers for the wrought-iron girders were at the rate of £23. 10s. per ton, while the estimate accepted from the Belgian firm was only £18. 10s. per ton. With regard to cast iron there was also a difference, but only to a smaller extent. Foreign iron appears also to have invaded Staffordshire as well as Yorkshire, some of it having been employed in the construction of a large fitting-shop in the Black Country, the difference in the quoted prices being nearly £6 per ton in favour of the Belgian iron—namely, £13. 2s. 9d. against £19. 4s.

As showing the economy of Belgian iron for other purposes than building it may be stated that in a recent competition for Vignoles rails in Bessemer, Martin, or Siemen's steel—the total order being 7,000 tons—English firms were considerably higher than German or Belgian houses. The Rhine Steel Company only estimated at 259f. 48c. per ton; the Glasgow Steel Company, 296f. 79c.; and Messrs. Charles Cammell and Co., Sheffield, 298f. 90c. It seems probable, therefore, that in order to compete successfully with foreign firms, English makers will have to lower their terms.—I am, Sir, &c.,

Sheffield.

G. G.

#### PREVENTION OF SCARLET FEVER.

SIR,—Scarlet fever, which for some weeks past has been prevalent in the east-end of London, has within the last fortnight appeared as an epidemic in this parish, and is gradually on the increase.

It is an intensely contagious and infectious disease, and not unfrequently assumes a malignant character; one child, having it in its mildest and simplest form may communicate it to another in whom it will become developed in its very worst form, and who will die in a very few hours; happily, however, the disease is controllable, and the spread of it may be effectually arrested by easy and inexpensive means.



The last epidemic of scarlet fever in St. Marylebone occurred in the years 1869-70; it destroyed no less than 461 lives, and it is greatly to be deplored that its widespread diffusion and fatality throughout the parish was undoubtedly due to the neglect of precautionary measures chiefly amongst the poorer classes. It is now earnestly hoped that the sad consequences of past neglect will operate as a present warning, and that all those in whose families the disease may unfortunately appear will avail themselves of the following directions, not merely for the safety of the other members of their own household, but for the general safety of their neighbours and public at large.

## DIRECTIONS.

1st. On the first appearance of the disease the patient should be placed in a separate apartment, as near the top of the house, and as far removed from other rooms, as possible, from which all curtains, carpets, bed-hangings and other needless articles of furniture should be removed, and no person except the medical attendant and the nurse or mother permitted to enter the room.

2nd. A basin containing a solution of chloride of lime or carbolic acid should be placed near the bed for the patient to spit in.

3rd. A large pan or other vessel, containing water, into which has been poured either a solution of Condy's fluid or carbolic acid, should be kept in the room, and into this all the bed and body linen, as soon as it is removed from the patient, and all soiled towels, &c., should be thrown: having been kept there some time the things may be removed, wrung out, and sent to the laundress.

4th. Pocket-handkerchiefs should not be used, but pieces of rag employed instead, for wiping the mouth and nose of the patient: each piece after being once used should be immediately burned.

5th. A plentiful supply of water and towels should be kept for the use of the nurse, whose hands of necessity will become soiled by the secretions of the patient; in one hand-basin the water should contain a teaspoonful or two of Condy's fluid, by which the taint on the hands is at once removed.

6th. All glasses, cups, plates, or other vessels used in the sick-room should be carefully washed in boiling water before being used by other persons.

7th. Outside the door of the sick-chamber a sheet should be suspended so as to cover the entire doorway, which should be kept constantly wetted with a solution of carbolic acid. This will keep every other part of the house free from infection.

8th. The discharges from the bowels and kidneys of the patient should be received into vessels charged with disinfectants, such as a strong solution of carbolic acid or chloride of lime, and immediately removed. By these means the poison thrown off from internal surfaces are rendered inert and deprived of the power of propagating disease.

9th. But the thin skin or cuticle which peels off from the hands, face, and other parts of the body in convalescent patients is highly contagious. The plan recommended for preventing the poisoned cuticle from being disseminated through the air is to rub camphorated oil, or lard over the skin. This practice is to commence on the fourth day after the appearance of the eruption, and continued every day until the peeling of the cuticle ceases. Warm baths should be administered every other day for about ten days, when the disinfection of the skin may be regarded as complete. This, however, should be done under medical advice.

Most of the foregoing directions will apply to all kinds of fevers, small-pox, and other contagious diseases.

It is to be deplored that there are in the parish a very large number of poor families who, for want of means to rent more than one room each, cannot possibly carry out all the above rules; but a strict attention to such of them as can be observed will help materially to lessen the risk and danger to the other members of the family, and, whenever it is possible, the patient should be removed to an hospital.

Whenever scarlet fever or other contagious disease terminates in death in a house occupied by more than one family, it is absolutely necessary to the safety of all the other inmates that the body should, as soon as possible, be removed to the mortuary house in the Paddington-street burial-ground, where it will be properly taken care of until the time for interment, and where all fitting respect to the dead is observed. The friends and relatives of the deceased may visit the building at all reasonable hours.

## MODE OF DISINFECTING A SICK-ROOM.

The patient having been removed, all linen articles, such as sheets, towels, pillow-cases, and body linen, is to be disinfected as by direction No. 3. This done, the blankets, counterpanes, and woollen articles of clothing are to be suspended on lines, and the mattress and beds placed over the backs of chairs; the furniture also to be removed from the walls, the windows closed, and paper pasted over the crevices; the chimney opening of the fireplace is also to be effectually stopped up. An old saucan-lid or other open iron vessel is next to be placed in the middle of the room, into which half a pound of common sulphur should be placed; the sulphur is then to be ignited by adding to it a few live coals, and the person who does it must immediately leave the apartment, close the door, and paste paper over the crevices.

At the expiration of 24 hours the room may be entered, and the doors and windows thrown open to allow the fumes of sulphur to escape.

By this process the room and everything in it may be considered to have been thoroughly disinfected.

Carbolic acid, with printed directions for its use, may be purchased at any chemists. Care must be taken to place it beyond the reach of children, as it is poisonous.—I am, Sir, &c.,

J. WHITMORE, M.D.,  
Medical Officer of Health for St. Marylebone.  
Court House, October 9th, 1874.

## Intercommunication.

## QUESTIONS.

[3500].—Weather-tight Casement.—Will any one inform me what is the best and cheapest weather-tight casement, opening outwards, in iron and wood, for dwelling-houses.—B.

[3501].—Drainage Works.—In a 12in. glazed pipe outfall sewer, what fall in 1,000ft. is necessary to overcome friction and insure a proper flow of the sewage?—QUERIST.

[3502].—Portland Cement.—How can oil-paint be made to stand on wall surfaces finished with Portland cement, say within six months of the cement being finished? It is found that either the oil separates from the colour and exudes, or else the surface of walls is covered with innumerable small blisters.—QUERIST.

[3503].—Tile Flats.—I shall be much obliged to any of your readers who will give me his experience of flats formed of three courses of tiles in cement. I wish to form a flat 17ft. by 20ft. How far apart may I with safety place the joists?—W. T. H.

[3504].—Stopping for Stone.—I shall be glad to know of some hard and adhesive stopping for a fracture in a Portland stone step.—H. B.

[3505].—Brick and Tile Making.—May I ask some one to be good enough to inform me of any works, more or less extended, on the subject of brick and tile making?—H. PHILLIP.

[3506].—Valuation of Tenant.—Weight and Measurement of Hay, &c.—I should like to know of some useful work on the above; also upon the measurement of solids?—F. W. H.

[3507].—Guide to Classic and Byzantine Architecture.—Will you, Mr. Editor, suggest to me the best published guide to Classic, Byzantine, and Romanesque architecture, and the details which characterise them? Is a stop chamfer a violation of decided Romanesque design?—CIVIL ENGINEER, P.W. Department, Graaf Remit, Cape Colony, Sept. 1st, 1874.

[In reply to "Civil Engineer," he cannot do better than consult Fergusson's "Handbook of Architecture," published, I believe, by Murray; or the treatise on "Styles of Architecture"; or, better still, "Principles of Design," by E. L. Garbett, in Lockwood's Rudimentary Series. The characteristics of Classic architecture are best learnt by studying the Greek temples and mouldings. Horizontal and continuous lines characterised the masses; the mouldings were ovolos and square members and fillets; the forms were rectangular, as a rule. In Byzantine architecture, circular and domical forms, blended with Roman and Greek detail, were the essential peculiarities of the style. In Romanesque we find very similar details, though the forms are more nearly allied to Roman types. Circular arches rising from columns without the interposition of an entablature is one essential distinction. The Romanesque was a kind of debased Roman that arose out of the Pagan, and was the first form Christian art took. It prevailed over the West, and everywhere under Roman power. The Byzantine sprang out of the Roman style after the age of Justinian as a distinct branch, and was practised in the East. A stop chamfer is not strictly applicable to the Romanesque style, where the forms are generally rectangular, mixed with cylindrical mouldings and hafts; but there is no law against its use, if its employment would add any advantage.—ED.]

## REPLIES.

[3438].—Lattice Girders.—The formula I gave "G. P." was for strains on flanges, of course presuming verticals between in the absence of any clear explanation as to the mode of connection. I do not see how I could have added to "Geometrician's" mistake when his reply was so evident. If "G. P." turns to p. 358 he will see my addendum to "Geometrician's" reply was for fixed and moving load, and applied to lattices; and in the same reply I also gave the formula for the flanges. But what was clearer than my first reply to "G. P." (p. 299), where I speak of strains at centre of top and bottom booms or flanges? I also gave him the rule to find the strains in any bay, and speak of verticals and inclined bars, though I see the word "and" is omitted by mistake. What more did "G. P." require?—ARCHITECT.

[3445].—Moment of Rupture.—"G. P." is in a complete fog as to this question. I want to convince him that the "moment of rupture" is really the effective strain a beam has to bear, or, in other words, that the strain at any point is proportional to its

distance from the weight. "G. P." indeed, agrees to the latter point, and also to my definition of the "moment of rupture," but still he says "the moment of rupture, as professionally understood, is not identical with the strains produced thereby." What matters whether it is professionally understood or not? The strains produced are identical, and no professional equivocation can show otherwise. Taking the example of "G. P.," it does not make any difference to the moment of strain whether the beam is 2ft. or any other depth; the only difference will be that the beam 2ft. deep will offer double the resistance to the strain a beam of 1ft. would offer; the strain still remains the direct product of the weight and moment, though inversely as the depth. "G. P." is mistaking the "moment of resistance," which is another thing altogether, and which is made up of the resistance of the fibres and the effective depth of beam or the leverage. If I wanted to find what sectional area was required in a certain flange, of course I should proceed as "G. P." does; but if I wanted to know the relative strains a beam would have, differently loaded, I should simply multiply the load by its distance from nearest support. "Student" wanted to know what the "moment of rupture" was, and my reply was fully explanatory: If I had said it was  $\frac{W L}{D}$  I should have

been giving him, not the simple moment or strain of a beam uniformly loaded, but the resisting power of a beam of certain depth, or the amount of strain in either flange. But "G. P." says his assertion is that of "acknowledged authorities." Let him leave authorities alone, and merely consult his own common-sense; but if he consults "Humber's Strains" he will find that the strains are said to vary as the moments of rupture; perhaps this will satisfy him. The ordinates, which I explained in a previous reply to give the moments, will also give the strains. One part of "G. P.'s" reply calls for notice. He says I state my reply was intended for "Student." Certainly it was; not for "G. P."; and his zeal to detect any error, though very praiseworthy, in this instance, I think, has a little exceeded discretion.—ARCHITECT.

[3488].—Bricks.—The term washed stocks is applied to stocks made from washed earth; common stocks are not all made from washed earth, hence the difference. The best red bricks that come into the London market are those made at Fareham, in Hampshire, by Mr. W. Cawte. The price is 56s. per 1,000. See St. Thomas's Hospital, and for rubbers, South Kensington Museum. These bricks have no equal in brilliancy of colour, combined with hardness and variety.—A. B.

[3493].—Disposal of Sewage.—The best plan to dispose of the sewage of a small town of 5,000 inhabitants is by running it into tanks and irrigating the land by intermittent downward filtration, as recommended by Mr. Bailey Denton. The solid matter could be deodorised and sold for manure.—G. H. G.

[3494].—Architect's Liability.—The architect is not liable if the owner cannot show any damage caused thereby.—G. H. G.

[3494].—Architect's Liability.—An architect is not surety for the builder, but the authorised as well as responsible representative and agent of the employer. He has some discretionary power over the mode of execution, and any want of "accordance with the specification" must be settled on its merits. It may be incorrect to assert that he "allowed" what he only failed to prevent, and as his duty involves general superintendence alone, "bad plumber's work out of sight" cannot affect him. No case could, even at first, have well been weaker, and time would certainly run heavily against a client who, specification in hand, should seek to implicate his architect after the lapse of two years.—X. Y. Z.

[2495].—Field's Flushing Tank.—An automatic tank or apparatus has been invented by Mr. Rogers Field, which consists of a cylindrical iron or stoneware tank, with a grated trapped inlet at the top. The outlet is a siphon, arranged so that the discharge takes place when the tank is filled with liquid and the siphon brought into operation. Its inner end is protected by a strainer, the outer end entering a trough which can be adjusted to outlet pipes or drain. Small quantities of water or sewage are thus collected for a time, and then the accumulation is discharged with a sudden flush by the siphon action. The apparatus, when used as a flushing tank, is required to be fixed between the supply and drain to be flushed, and connected respectively with them. The tank can be made use of where no regular sewerage exists, bed-room slops and refuse being thrown down the basin at top of tank outside the house: and thus, with the earth system for the solid refuse, it forms a complete system of removal. The outlet drain may be common 2in. land drain-pipes, with butt joints, and laid just below the surface; the liquid will then irrigate the soil. This arrangement is said to have been in operation in Essex nearly six years, and the tanks there are cleared out every two or three months.—G. H.

[3496].—Indian Ink.—In reply to "Draughtsman," spirits of hartshorn is quite as effective as ox-gall to allay the greasiness spoken of. A drop or two in a saucer full of ink is enough.—G.

[3498].—Construction of Concrete Houses.—I do not know of any authority in concrete building besides the descriptions of Mr. Tall's and Mr. Drake's processes. The best work on perspective is Nicholson's.—G. H. G.



## STAINED GLASS.

**BUDDOCK.**—A large window has been added to this church. It is a three-light ornamental window, with figures introduced. In the centre light is depicted Our Saviour, and in each of the side-lights are represented two Acts of Mercy. This window was designed and executed by Messrs. Cox and Sons, Southampton-street, Strand.

**MILTON MOWBRAY.**—In one of the east windows of the east aisle of the north transept in the parish-church of Milton Mowbray, a stained-glass window, by Wailes, of Newcastle, has been inserted. The opening has three compartments. The subject is the Family of Lazarus at Bethany.

**WINDY NOOK.**—Three large stained-glass windows have been erected in St. Alban's Church, Windy Nook, near Newcastle-on-Tyne. The subjects are St. Anne teaching Our Lady; Our Lord Blessing the Children; and the Presentation in the Temple. Mr. Baguley, of Newcastle, was the artist.

## STATUES, MEMORIALS, &amp;c.

**PAISLEY.**—On Thursday week the bronze statue, by Mr. John Mossman, of Glasgow, of Alexander Wilson, the Paisley poet and American ornithologist, was unveiled, and given over to the keeping of the magistrates and town council. The statue stands in front of the Abbey, and is thus described in a report by the committee read at the ceremony:—"A bronze statue, 7ft. 6in. high, standing on a pedestal of grey granite 10ft. in height. Wilson is represented leaning against the stump of a tree; behind him is his gun; at his feet are his hat and portfolio, on which is resting the little favourite blue parrot that accompanied him in many of his wanderings through the pathless forests of America. In his right hand he holds a pencil, and in his left a bird that he has recently shot, the beautiful plumage of which he is evidently admiring. While modelling the features, every available authority was consulted in order to give a correct likeness, and the committee believes the artist has succeeded in this, as well as in happily embodying the expression of the ornithologist and the poet."

**TORRES VEDRAS.**—A large monolith will shortly be transported from the quarries of Pero Pinheiro to Alhambra on the Tagus. The stone is destined to form part of a monument to be erected on the ancient lines of Torres Vedras to commemorate the famous stand made there by the British and Portuguese forces under Wellington, by which was frustrated the second French invasion of Massena in 1810. The design, as traced by Senor Cascaes, represents a column with a statue of Hercules, clad in a lion's skin, with club in hand. On the pedestal is the inscription in Portuguese, "Lines of Torres Vedras," and the Latin motto "Ne plus ultra." The idea of Senor Cascaes is no doubt based upon the ancient legend that the pillars of Hercules marked the limits of the world, there being no passage beyond. "Ne plus ultra."

## WATER SUPPLY AND SANITARY MATTERS.

**BARNESLEY.**—On the 1st of September last the Town Council of Barnesley appointed a committee, consisting of several of their number, to visit several towns where sewage works were in operation, and to report to the Council the result of their investigations. The Committee accordingly visited Birmingham, Coventry, Leicester, Bilston, Leamington, Grantham, Blackburn, Leeds, and Doncaster, and the report contains a detailed description of the processes respectively in operation in each of those towns. The conclusions arrived at by the Committee are—1. That the item of profit cannot be associated with the results of any of the known systems of treatment of sewage. 2. That the deposition of a vast and valueless amount of mud and sludge is common to all the precipitating processes. 3. That irrigation presents an opportunity of diminishing some sources of loss, and more certainly insures future immunity from complaint; and 4. That irrigation depends for its successful application on suitable land being available. Having arrived at these conclusions, the Committee decline to recommend the Council to proceed with the precipitation scheme recently submitted for adoption in Barnesley by Messrs. T. and C. Hawkesley, being of opinion that facilities exist for irrigation, and that a scheme may be devised combining precipitation, the use of the mud for manufacture into cement, and the subsequent use of the sewage water for irrigation purposes.

**BRIGHTON.**—After an interval of six years the *Lancet* has published a third report on the drainage of Brighton. In 1862, when the first report appeared, three-fourths of the houses drained into cesspools without any outlet, and the sewage from the remaining fourth was thrown into the sea directly in front of the houses, producing at low water an intolerable stench. The well water of the town was found to be, as might have been expected, very foul. In 1863 the drainage of the town had been considerably improved, and an iron pipe constructed in front of the Old Stoyne by which the sewage of the central portion of the town was carried one-third of a mile out to sea. This was a great improvement, but a considerable and increasing nuisance still remained. At last a radical reform was instituted, and an intercepting sewer constructed at a cost of about £150,000. This sewer is seven miles in length, and carries the whole

sewage of Cliftonville, Hove, and Brighton to Portobello, beyond Rottingdean, where it is cast into the sea. The *Lancet* regrets that this scheme was adopted instead of the alternative one proposed by Mr. Rawlinson, by which the sewage would have been carried westward and applied in land irrigation some distance beyond Cliftonville. The disadvantage of the present sewer is that for the last five miles of its course there is scarcely any fall. During floods it becomes completely filled. In this case the old outlets have to be opened, and the sewage sent straight into the sea. This was done only a few weeks ago, when the sewer was full as far back as the end of Edgware-street, at the north end of the Pavilion. The arrangements for flushing the sewer seem at present to be insufficient, which is the more surprising since a very slight fall of the sewer would seem to render almost daily flushing necessary. The sewer ventilators are also unsatisfactory. Those on the beach in front of King's-road are hardly higher than a man's head, and elsewhere they are on the level of the road. Great complaints are already made of the bad smells in the neighbourhood of the Pavilion, some of the flymen saying that they have had to move their vehicles to get out of the way of it. Tall shafts should be substituted for these open gratings, and, if necessary, a proper draught maintained in them by jets of gas. Unless something of this kind is done cases of typhoid will be almost certain to occur, and a complete panic might be the consequence.

**LINCOLN.**—Complaints are made of the sanitary condition of Lincoln, and fever is stated to be rife amongst the inhabitants. Several of the members of the Town Council, however, allege that it is one of the healthiest cities in the kingdom. A formal complaint to the Local Government Board, under sec. 49 of the Sanitary Act, 1866, of the Town Council having made default in not providing their district with sewers, is talked of.

**LOCHGELLY.**—The want of an adequate supply of water for Lochgelly has been much felt during the past few years. The Board of Supervision have, however, taken the matter in hand, and ordered the ratepayers to proceed at once to procure water, threatening, in the case of non-compliance, to proceed with the works at the town's expense. In consequence of this pressure, a committee of the ratepayers, along with Mr. Sang, C.E., of Kirkcaldy, have visited Benarty and Lochornie, near Blairadam, in order to test the qualities of the water at both these places. Mr. Sang was appointed to estimate the cost in each case and report to the committee at an early day.

**LONGTON.**—The Town Council of Longton are about to pay the Duke of Sutherland £500 a year to take the sewage off their hands. The Town Council are to carry the sewage to the boundary of the borough, and the Duke is to take it to his land. The works will, it is estimated, cost the Town Council £27,000. The population of the borough is 19,000.

**NEWPORT (SALOP) WATER SUPPLY.**—Mr. E. Pritchard, C.E., has been instructed to report on the present water supply of the town, with a view to its improvement.

**POLLUTION OF WATER IN WELLS AND PUMPS.**—The *Local Government Chronicle* observes that one of the most useful provisions in the Sanitary Law Amendment Act of last session is that with reference to "polluted water in wells and pumps." The section of the recent Act provides that if it is represented to any sanitary authority that within their district the water in any well, tank, or cistern, public or private, or supplied from any public pump, and used, or likely to be used, for domestic purposes, is so polluted as to be injurious to health, they may apply to any justices having jurisdiction in their district in petty sessions for an order to remedy the same. The justices are then to summon, in the case of a private well, tank, or cistern, the occupier of the premises to which it belongs, or if it be a public well, cistern, tank, or pump, the person who is alleged in the application to be interested in it. They may then, if they think fit, make an order directing that the well, tank, cistern, or pump shall be permanently or temporarily closed, or that the water shall be used for certain purposes only, or otherwise, as may appear to them to be requisite to prevent injury to health by the drinking of the water. Where necessary, the justices may cause the water to be analysed at the cost of the sanitary authority applying. We may add that the expenses in procuring the order and carrying it into execution, in the case of a rural sanitary authority, will be a special expense within the meaning of the Sanitary Acts. The provision is a very valuable one, and the fact that this new power has been given has already, in several cases, enabled the sanitary authority to secure the closing of polluted sources of water supply which, were it not for this enactment, they could not have interfered with with any prospect of success.

**RICHMOND.**—An application has been made to the Local Government Board by the Richmond Select Vestry for permission to borrow £20,000 for the purpose of obtaining a better water supply by sinking an artesian well into the chalk. Mr. Hawkesley, C.E., and Mr. Prestwich have been consulted on the subject, and it is stated they are of opinion that the scheme is perfectly feasible. The proposed reservoirs will be underground in Richmond Park, and the Crown authorities have, under certain conditions, already given their consent to this portion of the project.

**THE LIFFEY PURIFICATION SCHEME.**—A premature attack having been made upon the scheme for the puri-

fication of the Liffey proposed by the three engineers called into council by the Corporation, has led *Standard's* *Newsletter* to endeavour to obtain information as to the details of the proposal. The place of discharge of the sewage on the south side has been incorrectly assigned. It is proposed that it shall be discharged at the north side of the Pigeon-house wall, inside the fort, so that it is incorrect to state that the filth would be cast upon Sandy-mount and Merrion strands. Again the estimate of cost of the scheme has been misstated as £220,000, whereas it is £160,000 for sewers and reservoirs, and £30,000 for a mountain head pond. In making up this estimate, the figures used were the prices of like work done in the city, with from 25 to 33 per cent. added. It is said, also, that one or other branch of the scheme could be omitted, without spoiling the efficiency of the one that might be adopted. For instance, if the summer water alone were kept up in the river by means of a mountain reservoir, the nuisance would be abated, although the sewage system would remain incomplete.

**WARWICK.—HASELEY WATERWORKS.**—The Town Council of Warwick have made formal application to the Local Government Board for permission to borrow between £17,000 and £18,000, to carry out these works. The plans of the engineer (Mr. E. Pritchard, C.E.) have also been deposited. It is expected that an inspector will shortly be sent down.

## LEGAL INTELLIGENCE.

**A WARNING TO "JERRY" BUILDERS.**—At the Salford Borough Court, on the 1st inst., Fletcher Armstrong and Peter Dow, of Gordon-street, Lower Broughton, Manchester, were summoned for constructing ten dwelling-houses, the floors of which had six joists 7in. by 2in., instead of 7in. by 2½in., which is the width prescribed by the Salford Corporation. The houses in question are situated in Pendleton-street, Charlestown, Pendleton, and are called "Industrial Dwellings." A fine of £10 was inflicted, with the intimation that the penalty would be much heavier in any future cases that might be brought before the magistrates.

**THE RIGHT OF A MAN TO BREAK INTO HIS OWN HOUSE.**—At Cardiff police-court on Monday, Mr. R. O. Jones gave his decision respecting a case that has excited considerable interest. Sometime since Dr. Buist engaged Mr. Jackson to build a house for him in Crockherbtown. The house was to have been finished last March, but the builder failing to complete it from some cause, and Dr. Buist being refused possession, he, on Wednesday week, went with two men and broke open the front door, but, finding the builder inside, he attempted to eject him, and failed. The builder then summoned him for an assault. Mr. Jones adjourned his decision to consider whether a builder had any lien on a house he had built until the entire money was paid. Mr. Jones now said that a case had been decided precisely similar, and it was held that a builder had no more right to retain possession of a house which he had been employed to build than any other servant, and the person who employed him to build it could at any time turn him out in the same way as he could eject any other servant, and could break open the door if necessary, and eject, providing no more force was used than was necessary to turn him out. Dr. Buist was, therefore, justified in forcing open the door and endeavouring to eject the builder, but he, Mr. Jones, repeated that so many persons armed with crowbars had been taken, that there was a liability in so doing of disturbing the peace of the town, and the person so offending was likely to be indicted for inciting a riot. The summons was then dismissed with costs.

## CHIPS.

A verdict of "Manslaughter" was on Wednesday returned by a coroner's jury against John Baker, road-surveyor to the Pudsey Local Board. A lady was thrown out of her carriage on the 6th instant, and died on Monday last in consequence of her injuries. The workmen of the Local Board had been engaged in making a drain, and when they ceased work for the night left a heap of rubbish on the road without any watchman or lamp. The lady's carriage was overturned in consequence, and the jury considered that Baker was responsible for the omission.

On Saturday the memorial-stone of a new Wesleyan Chapel at Worth Village, Keighley, was laid. The chapel, which will accommodate 500 adults, will be a plain building, costing about £2,500.

We omitted to state last week of Highlunds, one of our illustrated subjects, that Mr. John Griffiths was the clerk of works.

The salary of the Surveyor to the Taunton Local Board was on Tuesday advanced to £200 per annum, with an additional £5 for superintending the Fire Brigade.

The new church at Bettesfield, Flintshire, was opened on Sunday. Mr. Street is the architect. The building will accommodate 180 persons.

The Board Schools at Kate's Hill, near Dudley, were formally opened on Monday week. They comprise boys', girls', and infants' schools, with classrooms, teachers' residences, &c., and are designed for the accommodation of 285 children.



## Our Office Table.

**ACREAGE OF THE LONDON PARKS.**—Hyde Park contains 380 acres; Kensington Gardens, 290; St. James's and the Green Parks together, 164; Regent's Park, 403; Victoria Park (before the late small addition), 280; Battersea Park, 230; Greenwich Park, 174; Crystal Palace (as originally laid out 400 acres, but reduced to) 168; Alexandra Park (as at first laid out 500 acres, now reduced to) 192; Clapham Common, 190; Wandsworth, 302; Wimbledon, 628; Barnes, 120; Epping Forest, 510; Kennington Common, 15; and Camberwell, 5 acres.

**STREET CLEANING IN NEW YORK.**—The estimates of expenses for 1875 for street-cleaning in New York are 899,478 dols., exclusive of the stock account, which raises the total cost to 1,128,478 dols. Over 1,000 men are employed in the street-cleaning bureau, and 300 carts are hired each day. In addition, there are a number of carts and street-cleaning machines belonging to the city, which are in constant use. The hire of carts amounts to 375,000 dols., and the pay of the men directly employed in cleaning the streets to over 400,000 dols., and the keep of 80 horses to 18,980 dols. The remaining expenses are for repairs, for coal, rent of stables, and pay of executive officers and clerks.

**TRAPS FOR THE UNWARY.**—At a recent meeting of the St. George's, Hanover-square, District Board, the surveyor called attention to open or perforated coal-plates, which he considered dangerous, mentioning that the other day a gentleman put the end of his umbrella into one of these perforations, and lifted the plate up, so that a lady just behind him fell over the plate. We agree with the surveyor in thinking the perforations referred to altogether unnecessary. A report on the question of coal-plates generally is to be prepared, with a view to further action in the matter by the Board. One of the members of the Board said it had been proposed some time before for the parish to have coal-plates and issue them to the ratepayers, but this the chairman thought impracticable.

**ANATOMY AND ART.**—Dr. Morrison Watson, the new professor of anatomy at Owens College, has delivered an inaugural address, in which he discusses the relation of his special science to the progress of art. Dr. Watson believes that the Greek sculptors made no study of anatomy. He considers their work a simple imitation of nature as it was presented to them in the individual forms of Greek youth and manhood, and he rejects the opinion of Haydon that the sculptors used science to correct the faults of imitation. Without discussing the truth of this view, the *Globe* remarks that the arguments brought forward by Dr. Watson are scarcely sufficient for the purpose. In comparing ancient art with the sculpture of the Renaissance, he instances the manner of Michael Angelo to prove that a knowledge of anatomy tends to an exaggerated expression of muscular action. But among the artists of his day, Michael Angelo does not stand alone in his anatomical correctness, nor can the alleged exaggeration in his case be fairly attributed to that source. Accepting for the moment Dr. Watson's assertion that the Greeks were ignorant of anatomy, it nevertheless remains certain that the calm and reserve evident in their work do not spring from that ignorance. The absence, or at least the control, of muscular action was a part of the Greek ideal. The life imaged in their sculpture was never brought into close contact with passionate movement, and they were not tempted, even in representations of the most lively scenes, to indulge in the emphasis that is proper to the art of Michael Angelo. With the painters of the Renaissance the aim was different. They deliberately sought to express all the possible passion and movement of life, and they would probably have made some attempt at the imitation of muscular movement even if they had known nothing of anatomy.

**CAPE COLONY.**—Our correspondent says a Commission has now been appointed by the Governor to decide in the matter of new Houses of Parliament, and their chief point appears to be as to site; upon this there is great difference of opinion. The thing is being considered now in a business-like manner, and competitors will not be long kept in doubt as to the merits of their designs. Advertisements are daily looked for in the *Gazette* inviting tenders for the various new

lines of rail to be constructed (altogether some 800 miles, as reported in my last letter). The Orange River bridges, too, will be constructed on the contract system. Parliament has compelled this, and is anxious to offer some 25 per cent above the Government estimates of cost. The appointment of a Colonial Hydraulic Engineer is to be made. The salary is to be £1,000 per annum, for three years at least, and his qualification is practical experience in irrigation works in Italy or India.

**PURE WATER IN TOWN AND COUNTRY.**—An efficient means of purifying water by filtration would probably be taken advantage of by many householders if they only saw their way to effect the same with little cost and trouble. We recommend to all such the perusal of a treatise just published by Messrs. Atkins and Co., of Fleet-street, on the "Water Supply to Country Residences, Town Mansions, &c.," in which the action of the filtering apparatus manufactured by that firm is fully described, and a considerable amount of information on the general subject of pure water supply afforded.

**THE LAST "DROP."**—The board of management being desirous of extending to the greatest numbers of the public the advantages of the technical instruction afforded by the International Exhibition before its close on the 31st inst., have decided to reduce the charge of admission to one penny daily, except on Wednesdays, when the charge will remain at a shilling. The reduction will commence on Monday next.

**CAUSES OF THE DIFFERENT QUALITIES OF WOOD.**—Mr. R. Brown, in his new "Manual of Botany," just published, in a summary of the causes of the different qualities of wood, shows that these differences must be referred to—first, the existence of vessels which are wanting in all true coniferæ, but exist in "joint firs" and in all foliaceous trees; second, the disposition, length, and size of the medullary rays, which are scarcely visible in coniferæ, and hardly more so in willow, poplar, elder, birch, hazel, and horse-chestnut trees; third, the presence or absence of cells or lacunæ containing resin, found so abundantly in most coniferæ, lacunæ being found chiefly in the firs, while cells containing this substance are more characteristic of the cypresses and yews; and fourth, the presence of a woody parenchyma, containing starch or other analogous products. The hardness or the weight of wood depends on the structure and development of its tissues. The differences in the definition of annual growth in various trees is also noteworthy. In oaks and chestnuts the outer limit of each year's growth is sharply defined by the layers of large dotted ducts, the open mouths of which can easily be seen in a transverse section. In other trees, such as maple, where the ducts are not so large, and are scattered, and in trees where there are no ducts at all, but only punctated tissue, the annual growth is defined by layers of minute and laterally-flattened wood cells, which form as the vital efforts get feeble, towards the end of the growing season.

**INDESTRUCTIBILITY OF CORK.**—In taking down, a few years ago, in France, some portion of the ancient chateau of the Roque d'Ondres, it was found that the extremities of the oak girders, lodged in the walls, were perfectly preserved, although these timbers were supposed to have been in their places for upwards of 600 years. The whole of the extremities buried in the walls were completely wrapped round with plates of cork. When demolishing an ancient Benedictine church at Bayonne, it was found that the whole of the fir girders were entirely worm-eaten and rotten, with the exception, however, of the bearings, which, as in the case above-mentioned, were almost completely wrapped round with plates of cork. The fixings were completed by a layer of greasy-feeling clay, interposed between the cork and the masonry, and the parts of the wall opposite the ends of the timbers were of brick. It would be very difficult, according to the *Artisan*, to believe that these extraordinary instances of the preservation of timber were not to be entirely attributed to the cork plates, the impermeability of which is well known. With experience saying so much in favour of a process so simple and inexpensive, it must be acknowledged that it deserves to be tried, more particularly for buildings of which we are more than usually anxious to preserve the timbers.

**PNEUMATIC BURIAL.**—A Vienna architect and engineer has proposed to the municipality of that city the adoption of what—

for want of a better title—we may call pneumatic burial. It is proposed to erect a great monumental hall or temple, which is to be divided into three apartments, subdivided into chapels suitably furnished and decorated. On a funeral taking place, the body in its coffin will be deposited in a sarcophagus in the centre of one of the chapels, and the ceremony proceeded with. At the conclusion, the chief mourner touches a spring, when the sarcophagus sinks noiselessly through the floor. This corresponds to the public burial, as, so far as the mourners are concerned, they have nothing further to do with the body. On its arrival, however, in the cellar, men stationed for the purpose attach a check to the bier, showing to which cemetery it is to be forwarded, and place the body, with three others, in an iron car which fits in a subterranean tube. This tunnel in Vienna will be 15,000ft. long, and the carriages will be propelled through its entire length by means of a blast of compressed air, in about ten minutes. The tubes are so arranged that the car can be started off to any cemetery by a separate road. On reaching its destination, a small building erected as a terminus, the bodies are removed and buried by officials in the places previously designated by the relatives of the deceased.

## CHIPS.

A new Courthouse was opened at Lurgan, Ireland, on the 8th instant.

Ash Priors Church, Taunton, was reopened on Thursday week, after restoration at a cost of £1,500, under the supervision of Mr. J. Houghton Spencer, of Taunton.

Four new Board Schools are to be opened in Leeds on the 11th of November.

The restoration of the south transept of York Minster is nearly completed, and it will be reopened early in the coming month.

The Parks, Commons, and Open Spaces Committee recommended, on Friday last, to the Metropolitan Board of Works, that the fountain in Leicester square be closed until the 1st May. It was stated that the water bill for supplying the fountain for three months, when it was playing for six hours a day, was £250, and that to work it for four hours per diem per annum would cost £1,000. The recommendation was adopted.

M. de Lesseps' plan of joining the Mediterranean with the string of lakes leading to the south of Algeria is likely to drop. A French engineer reports that the lakes are higher than the sea, and a canal would simply drain them; furthermore, if the plan were feasible, it would cost £12,000,000 sterling, on which there would be no adequate return.

Mr. J. Douglass Mathews, A.R.I.B.A., Treasurer and ex-President of the Architectural Association, Mr. W. T. Piper, of the Temple, Mr. Rowland Plunbe, Mr. George Lansdown, Mr. Robert Walker, Mr. H. Gundry, and Mr. F. Wallen, are candidates for the office of district surveyor for South Islington.

Lord Fitzwalter has accepted the post of President of the Annual Meeting of the Royal Archaeological Institute, to be held next year at Canterbury.

The Wesleyan Chapel at Hoby, Lincolnshire, has undergone considerable improvement by the introduction of new pews, and the chapel has been painted throughout.

The Esplanade at Ventnor is being considerably improved. The new Esplanade wall is now finished as far as the entrance to the pier.

The correspondent of a Church paper declares that the altar-lights in Chester Cathedral are not candles, but merely tubes of white china, through which gas-pipes are conducted.

A rich German has left all his property to the Commune of Kronstadt, to build and endow an Orphanage, Foundling Hospital, and College, but not till one hundred years have elapsed, during which period the property is to be allowed to accumulate.

St. Michael's Church, Chester-square, Pimlico, is undergoing enlargement. It already accommodates a congregation of 1,200 persons, and the extension will give space for an additional 400.

Several attempts are being made in seaport towns to utilise sea water for sanitary purposes. Dr. Yeld, medical officer of health for Sunderland, has recently presented a report on the question to the health committee of the borough. He contends for the superiority of sea water over fresh water in street watering, and alleges that when treated by the former the streets remain much longer moist even during very hot weather, and that by its means the cohesive power of the materials of a road is increased.



The Foresters' Hall at Cowes, has been enlarged and was reopened on Tuesday week.

The Town Council of Truro, proposing to provide their district with water, have sunk a well; but the well yielding no water at a depth of 62ft., the works have been stopped.

The town of Buckingham is to be lighted with paraffine, owing to a dispute between the Corporation and the gas company.

The collection of Church Furniture exhibited by Messrs. Jones and Willis, attracted considerable attention at the late Church Congress at Brighton.

The jury charged to decide upon the models for the statue to be erected at Mâcon to Lamartine, have adjudged the first prize of 3,000fr. to M. Falguière.

A memorial church is to be erected at Newmarket, in honour of the late Lord George Manners. It is to be dedicated to All Saints, probably, as the cynical correspondent of a provincial journal remarks, as a compliment to the Jockey Club, of which the deceased nobleman was a distinguished ornament.

An Italian architect named Ludovico Stanziani, who had acquired a high position in Russia, in which country he had resided since his youth, has left by his will the greater part of his large fortune and a rich collection of medals to an artistic society in Rome, called the Virtuosi of the Pantheon, for the purpose of founding a capital to enable three young artists—painters, sculptors, or architects—to continue their artistic studies without expense.

There are 159 candidates, among whom are represented all the principal European nationalities, for the construction of the Municipal Theatre of Odessa. M. Charles Garnier, architect of the French Opera, is one of the competitors.

The death, at Paris, is announced of M. Achille Tabutin, aged 62, a well known decorator.

The prison of Clairvaux (Aube) was the scene of a melancholy occurrence last week. M. Etienne, one of the architects of the building, and who has apartments inside, was returning home at a late hour, when, not having replied to the challenge, repeated three times, of a sentinel, the soldier fired and wounded him mortally. He expired a few hours later.

A Committee has been appointed to consider the expediency of constructing a breakwater in Swanage Bay, on the coast of Dorset.

Mr. Luff, the contractor for the rebuilding of St. Helens Church, Ipswich, has commenced the demolition of the old structure.

New Board Schools at Haverstock-Hill were opened last week. The architect was Mr. E. R. Robson, and the schools are built in the Queen Ann style at a cost of £9,000, the contractors being Messrs. Wall Brothers, Kentish Town.

Cardinal Callen laid the foundation-stone of the new hospital of St. Michael, Kingstown, on the 1st inst.

Essex Bridge, Dublin, was reopened on the 1st inst. It is a spacious and substantial structure, without ornamentation.

The new entrance to the Royal Aquarium, Brighton, is now nearly completed. It comprises a tower, with a four-dialled clock, and adorned with four bronze statues, representing the four seasons of the year. Toll-houses, turnstiles, and ticket offices are also included in the buildings.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHELVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB and SON,  
Makers to the Bank of England,  
57, S. Paul's Church-yard, E.C.  
And 63, S. James's street, S.W.—[ADVT.] } London.

## The Timber Trade.

GREENOCK.—The last of the first fleet of timber ships has arrived in the Clyde, and with the exception of two or three, the whole of the vessels have discharged their cargoes. A number of the ships comprising the "fall" fleet are on their way home from Quebec, and it is expected that the port will again become crowded. The accommodation at Greenock harbours has always been too limited for the extent of the trade, but not for many years has its capabilities been so well tested as this year. So crowded, indeed, have the harbours been that vessels have been laid up at the Tail of the Bank for two or three weeks at a time waiting on berthage. There is a talk of extending the harbours, but party strife among the municipal bodies is likely to do more harm than good to the scheme. At present two different com-

mittees of the Harbour Trust are sitting on the question.

The following are the wholesale current prices per superficial foot:—

	s. d.	s. d.
Honduras Mahogany, cargo aver.	0 4	0 5½
Mexican "	0 4½	0 5½
Tabasco "	0 5	0 6
Cuba "	5 6½	0 10
St. Domingo "	0 7	0 10
" "	curls	1 0
Cuba cedar	0 4½	0 5
Honduras and Mexican cedar	0 3½	0 4½
Australian do.	0 3½	0 4½
Pencil	0 2	0 3½
Italian walnut	0 4	0 5
Black sea "	0 3	0 4
Canadian "	0 3	0 4
Bird's-eye maple	0 5	0 7

Per ton.

	£ s.	£ s.
Bahama satinwood	7 0	9 0
Rio rosewood	14 0	20 0
Bahia "	12 0	18 0
Ceylon ebony	12 0	18 0
Lignum Vitæ	6 0	10 0
Turkey boxwood	5 0	16 0

Per load of 50 cubic feet.

	s. d.	s. d.
Australian ironbark	170 0	220 0
Greenheart	250 0	270 0
Indian Teake	220 0	280 0
Quebec red pine, building	70 0	80 0
" yellow pine, large	110 0	130 0
" " waney board	110 0	130 0
" " small	80 0	90 0
Pitch pine	75 0	85 0
Quebec oak	140 0	160 0
" rock elm	120 0	0
" ash	140 0	0
" large birch	110 0	0
New Brunswick birch	60 0	0
Riga fir	80 0	85 0
Baltic crown fir	90 0	0
" best middling	80 0	90 0
" common middling	55 0	65 0
" undersized	55 0	60 0
Stettin fir	60 0	70 0
Swedish fir	60 0	65 0
" small	50 0	58 0
Crown Memel oak	110 0	160 0
Brack	105 5	0
Red Pine masts	90 0	120 0
Yellow Pine masts do. large	80 9	130 0
Oregon	180 0	240 0
Kawie "	160 0	220 0

Per foot run.

	d.	d.
Christiana Poles	1½	2

At each.

	d.	d.
Christiana rickers	6	8

Per cubic fathom.

	£ s.	£ s.
Firewood	5 5	5 10
Swedish deal ends	4 10	0
Norway red and white boards	3 10	0
" round and slabs	3 10	0
Lathwood	0	0
Petersburg	9 0	0
Riga, &c.	7 0	0
Oak Staves per mille of pipe.	£ s.	£ s.
Crown Memel	250 0	270 0
Brack	200 0	220 0
Canadian standard pipe	75 0	80 0
" puncture per 1200 piece	17 0	19 0
Bosnia, single barrel per do.	31 10	0
U. S. pipe.	50 0	72 10
" hhd. heavy and extra	30 10	45 0
" slight hhd.	11 0	21 0

Per 18ft. cube.

	£ s.	£ s.
Riga crown wainscot logs	5 10	6 0
" brack	4 15	5 0
Memel crown	4 15	5 10
" brack	3 15	4 5

Per square of 1 inch.

	s. d.	s. d.
Best yellow	14 6	17 6
" white	13 6	14 6
Second qualities	12 6	15 0

	£ s.	£ s.
Quebec pine, 1st bright	21 0	24 10
" 1st floated	20 0	0
" 2nd bright	13 0	14 0
" 2nd floated	14 0	0
" 3rd bright	11 0	12 0
" 3rd floated	12 0	0
U. S. Pitch pine	14 0	15 10
Archangel, 1st yellow	16 10	17 10
" 2nd	13 0	14 0
" " white	10 0	10 10
Petersburg, 1st yellow	13 10	15 10
Wyburg	13 0	14 0
Quebec, 1st spruce	11 0	12 0
" 2nd "	10 0	10 10
" 3rd "	9 10	0
St. John's spruce	9 0	10 0
Spruce battens	8 0	9 0
Bjorneborg, 1st yellow	12 15	13 5
" 2nd "	11 0	12 0

	£ s.	£ s.
Geffe, 1 and 2 in. yellow, 4in.	15 0	0
" 2½in.	12 0	12 10
" 3rd	3in.	14 10
" 4th	4in.	12 10
" "	3in.	13 0
" "	Per 120 12ft. 2½ by 6½	12 0
Dram, 2nd yellow.	9 10	10 0
" 3rd	9 0	9 5
" 3rd white	8 0	0
Drontheim, 1st white	10 10	0
" 3rd	9 0	0
" "	Per 40ft. 3in.	0

	s. d.	s. d.
Dantzlg crown deck deals	25 0	32 0
" " brack do	17 0	22 0

## WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay.—For samples and further particulars, apply to the MANAGER, at the Quarries Narberth-road, R.S.O.—[ADVT.]

## TENDERS.

BECKENHAM.—For Christ Church, Beckenham. Messrs. Blashill and Haywood, architects. Quantities by Mr. D. Cubitt Nichols.

	Nave, &c.	Chancel.	Spire.	Total.
Waldram & Co.	£5,150 0	0	£1,152 £744 0	£7,046 0 0
Manley & Rogers	5,120 0	0	1,150 730 0	7,000 0 0
Browne & Robin-	5,100 0	0	1,110 700 0	6,910 0 0
son				
Brass	4,989 0	0	1,150 750 0	6,889 0 0
Hill, Higgs, &	4,940 0	0	1,000 700 0	6,640 0 0
Hill				
Gascoigne & Sons	4,859 0	0	1,016 673 0	6,548 9 0
Dove Bros.	4,855 0	0	940 650 0	6,445 0 0
Crossley	4,797 0	0	1,017 626 0	6,440 0 0
Hooker	4,700 0	7	1,006 634 1	6,400 1 7
Gammon & Sons	4,396 0	0	873 557 0	5,826 0 0

CLAPHAM.—For new house at the corner of Clapham Common, for Mr. S. W. Cawston. Messrs. Habershon and Brock, architects.

Browne and Robinson	£3,220 0 0
Loat	3,219 7 0
Waldram and Co.	3,115 0 0
Scrivenner and White	2,998 0 0
McLachlan	2,994 0 0
Manley and Rogers	2,975 0 0
Sharpington and Cole	2,967 6 0
Newman and Mann	2,840 0 0
Carter and Son	2,797 0 0

ENVILLE.—For house on the Enville estate for the Right Hon. the Earl of Stamford and Warrington, Mr. T. Smith, architect. Quantities by T. C. and J. P. Sharp.

Binian and Sons	£2,950 0 0
Nelson	2,939 0 0
Wood and Sons	2,750 0 0
Guest (accepted)	2,387 0 0

FINSBURY.—For the erection of new schools to accommodate 716 children, in Poole's Park, Finsbury, for the London School Board. Mr. E. R. Robson, architect.

Goodman	£7,935 0 0
Brass	7,643 0 0
Ennor	7,609 0 0
Williams and Son	7,516 0 0
Wall Brothers	7,499 0 0
Perry and Co.	7,361 0 0
Niblett and Son	7,350 0 0
Pritchard (accepted)	7,296 0 0
[Cost of site, £2,500. Cost of building per head, £10. 5s. 9d.]	

HERTFORD.—For alterations and additions to the London and County Bank, Hertford. Mr. E. Evans Cronk, architect, 23, Cockspur-street, Charing cross, S.W., and Seven-oaks.

Hunt	£2,860 0 0
Norris	2,705 11 0
Rider and Sons	2,545 0 0
Hill, Higgs, and Co.	2,484 0 0
Hampton jun.	2,392 0 0
Naylor (accepted)	2,293 0 0

HIGH WYCOMBE.—For new cottage hospital, Bucks. Mr. Arthur Vernon, architect.

Berry	£1,807 4 0
Walter	1,700 0 0
Taylor	1,595 0 0
Cooper	1,570 0 0
Banghurst	1,556 6 0
Loosley	1,481 12 0
Snell	1,412 0 0
Reavell	1,400 0 0
Sexton	1,395 0 0
Woodbridge	1,376 13 6
Hunt	1,369 0 0
Spicer	1,320 0 0
Webb	1,264 0 0

HORSELYDOWN.—For alterations and additions to the Charles-street, Horselydown, Schools, so as to afford additional accommodation for 200 girls and 182 infants, for the London School Board. Mr. E. R. Robson, architect.

Williams and Son	£5,765 0 0
Newman and Mann	5,756 0 0
Wall Bros.	5,447 0 0
Downs and Co.	5,390 0 0
Staines and Son	5,284 0 0
Nightingale	5,196 0 0
Tyerman	5,025 0 0
Sheffield (accepted)	4,947 0 0
[Cost of new building per head, including alterations to existing school, £12. 19s.]	

LIVERPOOL.—For the supply of gas-fittings for the Ashfield-street Schools, for the Liverpool School Board.

Midwood (accepted)	£82 0 0
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**LIVERPOOL.**—For the erection of new hall for the "League Hall Recreation Company," St. Ann's-place, Liverpool. Messrs. T. E. Murray and G. H. Thomas, architects. Quantities supplied.

Urmsou (too late) .....	£14,630	0	0
Miller .....	14,590	0	0
Burroughs and Son .....	14,203	0	0
Tomkinson .....	13,875	0	0
Wells .....	13,690	0	0
Cheetham .....	13,500	0	0
Hall and Owen .....	13,500	0	0
Wilkinson and Adams .....	13,100	0	0
Mullin .....	12,500	0	0
Dyer .....	12,500	0	0
Speddy .....	12,000	0	0

**PERU.**—The contract for the construction of the Lima and Pisco Railway, Peru, 145 miles long, tapping the rich and productive valleys and sugar plantations between Surco, Chovilles, Lurin, Mala, Comilla, Canete, Chiccha Alla, and Chiccha Pisco, and connecting the important towns of Lima and Pisco with the now flourishing shipping ports of Callao and Pisco on the Peruvian Coast, has been taken by Mr. Robert Walker, Contractor and Engineer, of 4, Westminster Chambers, Victoria-street, Westminster, S.W., the Peruvian Government having granted a concession, giving the land, and guaranteeing £1,040,000 towards the work, which will be proceeded with forthwith, and the railway will be completed in three years.

**SOUTH KENSINGTON.**—For alterations, &c., to shop front, No. 96, Fulham-road, S.W., for Mr. A. Chase. Messrs. Ebbetts and Cobb, architects.

Perkins .....	£383	0	0
Wagner .....	296	0	0
Walker .....	195	0	0

**WALTON-ON-THE-NAZE.**—For the erection and completion of three houses at Walton-on-the-Naze. Quantities supplied by Mr. Horace Darken, architect and Surveyor, Colchester.

Canham .....	£2,125	0	0
Everett and Son .....	1,960	0	0
Charlin .....	1,960	0	0
Clark and Son .....	1,950	0	0
Shepherd .....	1,949	0	0
Saunders and Son .....	1,940	0	0
Pitt .....	1,930	0	0

**WHITECHAPEL.**—For additional buildings at the Sailor's Home, Dock-street. Mr. John Hudson, architect.

Read and Son .....	£293	0	0
Guthwaite and Son .....	894	0	0
Thomas Little .....	879	0	0
Jacobs .....	860	0	0

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**ROCHESTER, Dec. 5.**—For designs for houses proposed to be built on the City Garden Estate. Premiums of £30 for the best, £20 for the second, and £10 for the third best designs. R. Prall, Town Clerk, Town Clerk's Offices Rochester.

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#### CONTRACTS OPEN FOR BUILDING ESTIMATES.

**APPLEBY BRIDGE, Oct. 21.**—For the erection of a cottage, coach-house, and stable buildings. Messrs. C. S. and A. J. Nelson, architects, Albert-chambers, Park-row, Leeds.

**BALA, Oct. 27.**—For the erection of a new workhouse, board-room, vagrant ward, and boundary walls. Mr. W. H. Spaul, architect, Oswestry.

**BIRMINGHAM, Oct. 19.**—For forming a new course for the river Lea, lowering a road, and erection of a bridge, &c. Mr. W. S. Till, Borough surveyor, Moor-street, Birmingham.

**BRIGHTON, Oct. 19.**—For the construction of a new timber groyne, and other works. Mr. P. C. Lockwood, C.E., Town Hall, Brighton.

**BURTON-ON-TRENT DISTRICT SCHOOL BOARD, Nov. 2.**—For the erection of a school, in And staff-lane; also for schools, board-room, offices, and keeper's house in Guild-street. Messrs. Giles and Brookhouse, architects, 9, St. James's street, Derby.

**CENTRAL LONDON SICK ASYLUM DISTRICT, Oct. 26.**—For additional laundry buildings at Highgate Indrmary. Messrs. Giles and Gough, architects, 28, Craven-street, W.C.

**CHELSEA, Oct. 20.**—For supplying a portable hand crane to lift 3 tons; weighing machine; and for constructing a railway along the river front of a wharf. C. Lahee, Vestry Hall, Chelsea.

**CLEVEDON, SOMERSET, Oct. 27.**—For providing and laying about 1,600 yards of stoneware pipes sewers, and constructing manholes, ventilators, &c.; also for providing and laying about 250 yards of cast iron pipes, &c. Mr. Henry Woodforde, Clerk to the Local Board, Clevedon.

**GLASSLAW, Oct. 24.**—For the erection of schoolhouse and teacher's residence. Messrs. Ellis and Wilson, architects, Aberdeen.

**GLASGOW, Oct. 20.**—For the construction of the Glasgow, Bothwell, Hamilton, and Coalbridge Railway. Mr. A. Simpson, C.E., 175, Hope-street, Glasgow.

**HEADINGLEY, NEAR LEEDS, Oct. 31.**—For the erection of 11, middle-class houses. D. Dodgson, architect, 18, Park-row, Leeds.

**HEADINGLEY, NEAR LEEDS, Oct. 20.**—For the erection of a villa residence in Oil Mill Lane. Mr. C. Fowler, architect, Britannia-buildings, Leeds.

**LEKLEY, Oct. 21.**—For the erection of a villa residence in Parish Gill Drive. Mr. G. Smith, architect, 9, Market-street, Bradford.

**LEEDS, Oct. 19.**—For erecting 4 middle-class houses on the Wortley Grange Estate. Mr. W. Watson, architect, Barstow-square, Wakefield.

**MANNINGHAM, Oct. 28.**—For the erection of sixteen houses in Midland-road. Mr. G. Smith, architect, 9, Market-street, Bradford.

**MIDLAND RAILWAY.—BRADFORD AND MANNINGHAM, Oct. 20.**—For extending the Midland-road to Trafalgar-street. Engineer's Office, Wellington Station, Lee Is.

**NESTON AND PARKGATE LOCAL BOARD, CHESTER, Oct. 31.**—For the construction of cast-iron and earthenware pipe sewers, subsidence and storage tanks, and other works. Messrs. Goodison, Atkinson, and Forde, Civil Engineers, Orange-court, Castle-street, Liverpool.

**OVENDEN, Oct. 19.**—For the erection of St. George's Church. Messrs. Jackson and Fox, architects, 20, George-street, Halifax.

**THORNECOMBE, DORSET, Oct. 21.**—For the erection of new school and master's house. Messrs. Dommett and Canning, Chard.

**WAR DEPARTMENT CONTRACTS, Oct. 24.**—For additions and alterations to the barracks, Preston. Commanding Royal Engineer, Royal Engineer Office, 12, Princess-street, Combrook, Manchester.

**WREXHAM, Oct. 31.**—For constructing an impounding reservoir in the township of Moreton Above, Parish of Ruabon. Mr. Frederick Storr, 5, Charles-street, Wrexham.

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## THE BUILDING NEWS.

LONDON, FRIDAY, OCTOBER 23, 1874.

## POPULATION AND THOROUGHFARES.

THE Holborn Viaduct and the Thames Embankment were two Metropolitan improvements imperial in their magnitude and vital to the future development of London. The former removed a serious obstacle and danger to the communications between the most crowded quarters of the capital, while the latter was not merely an architectural triumph, relieving London from one of its worst reproaches in the opprobrious state of the river, but promised an easy and free circulation of passengers and vehicles to lighten the overwhelming traffic of Fleet-street and the Strand. It has only partially accomplished the one object, and wholly failed to accomplish the other. Practically speaking, the Embankment is a desert, scarcely recognised among Metropolitan highways—and why? Because it is blocked in with impenetrable barriers. There is an inlet for carriages and cabs passing the condemned stateliness of Northumberland House; there is another in the confused and labyrinthine region near Temple Bar—for the only other way of ingress is down a flight of mouldering stone steps; and there is no other approach from this to the awkward curve, soon to be widened and rounded off, it is said, by the removal of two or three hotels and other buildings, at the northern end of Blackfriars Bridge. Now, the inhabitants of the district concerned, and all whose business takes them through it, complain that London has by no means the full benefit of a work so costly, and declare that the riverside is scarcely more available at present, as a means of carrying off the superabundant traffic between East and West, from Westminster-bridge to Bridge-street, than in the days when Sir Frederick French designed his massive causeway, and John Martin indulged, forty years ago, in his Babylonian dream. The legal sanction for the Embankment and the roadway was obtained in 1863, and by the autumn of 1865 the undertaking was commenced on both sides of the Thames. It has long been—so far as the original plans went—complete; but what were its purposes, and how have they been fulfilled? The metropolis acquired a splendid thoroughfare, reared on foundations of Roman solidity, a hundred feet wide, protected by a handsome parapet, with two side-walks and an ample carriage-way, admirably paved, and with approaches, as defined by the Act, from Westminster and Blackfriars Bridges, Whitehall-place, Lancaster-place, Waterloo-bridge, and the front of the Adelphi. But the principal of these projects were abandoned, and the scheme of carrying on the Embankment to the back of the Mansion-house appears to have been indefinitely postponed; perhaps because the purchase of Northumberland House fell so heavily upon the Board which sits with a sort of Parliamentary power in Spring-gardens. Two-thirds, at least, of the project has disappointed those who paid for its development. While Fleet-street is clogged, crowded from end to end, with the pole of one omnibus threatening the door of another, ponderous waggons turning at every hundred yards out of court, inn, or alley, a dislocated line of vehicles wriggling its way along, light carts and railway-vans making a Hellespont of the Middle Passage, and no safety or expedition from point to point of the encumbered gorge, as it may fitly be termed, a few foreigners or country people, or Hansoms with uncommonly knowing drivers, have the Embankment almost entirely to themselves, whereas, it was expected to act as a kind of

main drainage to this section of the Metropolitan traffic. The last proposal is to inaugurate a system of relief by piercing, from Whitefriars and Bouverie-streets, the comparatively waste and worthless piece of ground known as Whitefriars Dock, and this might, indeed, float away a fair proportion of the rush continually made towards the Southwark side of the river. These details, however, are unimportant in comparison with the general principle involved, which is that dominating the circulation, through the heart and the extremities of such a city as London, the Pekin of Europeans. The more its commerce centres itself within particular limits, the heavier becomes the crush in every avenue of approach, and from Charing-cross to the Bank, and from Tottenham-court-road to the Royal Exchange armies, baggage trains, and sutlers innumerable are, if so it may be expressed, perpetually marching. Times without number diagrams have been drawn showing that all this complication of traffic is unnecessary; yet compare the breadth of the Holborn viaduct with that of Newgate-street; of Fleet-street and the Embankment, combined with that of Ludgate-hill; of one end of Chancery-lane with another; of a hundred defiles through which two cabs cannot pass, conducting to squares in which an army might encamp, and what is to be looked for except confusion, accidents, and congestions? Like all other towns constructed upon no plan, London straggles at its extremities, and cramps itself where the population throngs thickest, and the movement is most incessant and rapid. But, with all this, and the ever-growing necessity of an unrestrained locomotion, conducing to large railways, tramways, schemes of streets built one upon another, and subways following the course of the sewers, artificial impediments are not only maintained; they are endured and respected with all the deference exacted by a misunderstood tradition. It was not until after a century of remonstrance that Holborn Bars and, still later, Middle Row, Holborn, went the way of all worthless excrescences claiming antiquity while possessing none in the genuine sense of the term. Like many other long-championed relics, they disappeared at last, and nobody has ever uttered a syllable of regret over the rotten structure that constituted, at Brook-street, the entrance to "High Holborn," and the line at which the Liberties of the City of London terminate. Neither, glancing at the magnificent Viaduct, would the most infatuated antiquarian deplore the arching over of the Fleet, or the obliterating Oldbourne Bridge. The "Heavy Hill" itself is no more, although London seems, generally, not in a hurry to abolish its nuisances in these respects. Whitechapel Bars have gone; but the bars of the Bedford, Cubitt, Camden, and Grosvenor estates still stand, obnoxious and peremptory, challenging the right of the Londoner to traverse London even by way of its streets, crescents, and squares. With reference to the Duke of Westminster, however, it should be recorded, to his credit, that not very long ago he volunteered to pull down all the gates upon his allotment of the metropolitan territory, though, strangely enough, this graceful offer was refused, on account of motives at which no guess need be made. Only the other day a disastrous accident reminded us of the invincible barriers that close several approaches to the north of London, driving all the traffic into Tottenham-court-road. It may be that an apology is possible for the artificial *impasse* in front of London University Hospital, in Gower-street; nevertheless, no similar eyefore and inconvenience was found essential in the case of King's College. Still, any plea, perhaps, is better than none, or one which is, upon the face of it, offensive; as, for example, undoubtedly are the obstacles to a passage through St. James's Park, the guarded gate

of the Horse Guards, the distinctions insisted upon between vehicles for hire and private carriages, and the sanctity of Constitution Hill. Most persons are aware that, after a particular hour, empty cabs may not pass up or down Bow-street—a regulation laughed at and evaded during every night of the opera season by the carrying of sham fares; but is all this interference required, or is it not, rather, a remnant of the spirit which so angrily resisted the opening up, as a new and brilliant thoroughfare, of Regent-street? In the year 1818 a surveyor named Charles Pitt, representing a great body of people, wrote a philippic against the park, the canal, and the street, gloomy enough to alarm a generation of moralists and taxpayers. There would be no limit, it was prophesied, to the cost; a hundred ancient and cherished landmarks would be overthrown; property must ruinously diminish in value; exorbitant compensations would have to be paid; and Regent-street would never be popular. The result has been seen. There is no part of the metropolis more favourite or flourishing. The Thames Embankment, however, like the Holborn Viaduct, was not destined to blaze with silversmiths' and mercers' shops, with windows full of jewellery or facades of decorated architecture. It could only be useful as a thoroughfare, attractive as a promenade, or healthful as a playground. Yet what proportion of the traffic has turned itself aside from the Strand or Fleet-street to rattle lightly over its miscellaneous-constituted pavement? Scarcely any. It is as though a police prohibition closed the passage. As for the lining of structures destined to adorn these superb quays, it is, as yet, invisible, for mid-London turns its back upon its most splendid trophy. Meanwhile the archaeologists, leaving this truly grand work to neglect, affect to pine over the water-gate in Buckingham-street, and the ghastly and ugly chronicles of Temple Bar. The thing was a mistake from the beginning. It has been the fashion, of late, to call this big terrace of concrete and York paving a boulevard; it is nothing of the kind, any more than the Holborn Viaduct is. That which the metropolis needs is a genuine boulevard—connected, continuous, encircling, fascinating to the inhabitants, thronged with well-ordered traffic, bright with wealthy shop-fronts, bank facades, monuments, occasional widening into square or crescent, and noble, while still utilitarian; such, indeed, as invariably prevents a glut of coming and going in Paris and St. Petersburg. Not that they are comparable, in point of extent, density, and commercial commotion, so to speak, with the English capital; they have provided, at all events, for any degree of possible expansion. Not, again, that London has not been reconstructed by a hundred hands, on paper, with a view to relieving its thoroughfares, in which, to tell the plain truth, trade is injured by commerce, and commerce by trade; the retail by the wholesale, and vice versa. Notoriously, it is more difficult and tedious to get from Bayswater to Whitechapel, from St. John's Wood to Mile End, from Hampstead to Camberwell, than from the Borough to Brighton. The improvement of London Bridge and its approaches has not to the slightest extent alleviated the daily deadlock from forenoon to evening; the widening of Cannon-street has not lessened the pressure in Cheapside, which is often scarcely better than impassable; and nothing has come, with any large result, of the several schemes propounded; tunneled streets; streets carried on iron frames; continuous balconies; house-to-house tramways, far above the common level; a central railway terminus, and so forth, although the work has been necessarily going on, and the exigencies always increasing. As to the relations between the two counties, Middlesex and Surrey, similar remarks apply. Some of the bridges are overthronged, and, it may be



feared, overweighted; while others appear hardly to serve any general purpose at all. In effect, this metropolis, in the height of the commercial and fashionable season, is choked by its own attractions and its own prosperity, and thoroughfares like Fleet-street or Holborn, Bond-street or Regent-street, are scarcely less passable than Chancery-lane or Fetter-lane. Southwark Bridge long promoted this paralysing state of things; Waterloo Bridge does so still; it is only within a few years that Westminster and Blackfriars Bridges have been rendered either commodious or safe. London, indeed, has been among the most dilatory among the great cities of Europe in recognising the importance of a free traffic by way of thoroughfares systematically feeding and relieving one another.

#### THE SHAFTESBURY PARK.—“ARTISAN CITY.”

OUT of a dreary waste south of Battersea Park not long since a low, swampy flat, over which the Thames periodically flowed, and cut off by a network of railways on one side, and on the other by the Wandsworth-road, has sprung up within the last two years a new neighbourhood—an “artisans’ city.” Having paid this neighbourhood a visit, and observed somewhat closely the manner of laying-out and the construction of the dwellings erected upon the spot rejoicing under the euphonious designation of the “Shaftesbury Park Estate,” we are induced to describe its *locale*, and the manner in which the Directors of the Artisans’, Labourers’, and General Dwellings Company have carried out their scheme. We do this with more interest, as we learn the Company are about extending their operations under the borrowing powers of an Act recently passed. The prominence which has been given to the philanthropic motives of the projectors led us also to examine with some degree of minuteness the arrangement of the houses and the advantages offered. That some of these advantages have been greatly exaggerated we cannot doubt; we will allow, however, our readers to form their own opinion.

The estate occupies a dead flat, bounded on two sides by the London, Chatham and Dover, the South Western, Brighton and South Coast, the Western Extension, and the Midland lines. Though close to so many railways, it almost seems a paradox to add, there is no nearer railway-station than that of the Wandsworth-road, or Clapham Junction, which is quite a mile distant. This is at least unfortunate for the working-man, who, of all conditions, requires a speedy and inexpensive transit to his daily work. A return fare of 8d. to the City daily as a third-class fare is an item of serious consideration to him, and the sooner the Company get their proposed station on the estate the better. We are informed that if the estate can guarantee an annual income of £500 per annum, one of the railway companies will establish a station. Taking a fair proportion of the residents, this sum might easily be secured, but the question is, will such a proportion be found to pay the daily fare? Before proceeding to speak of the houses, let us take note of a few other matters connected with their external comforts, and the drainage and water supply. On the threshold of our inquiries, we find some untoward circumstances have seriously operated against the success of the Company’s projects. Litigation is pending between the Company and the Local Board as to the system of drainage adopted. As carried out, the back system of drainage has been adopted, no drains running under the houses. Few can object to so reasonable plan, provided other conditions are favourable. But the Board, it would seem, have not been consulted, or, at any rate, they take exception to the plan, and require front drainage. The hitch is likely to prove troublesome. Gas-pipes also are laid in; though here another hitch seems

probable between the gas company and the Estate, each claiming a right to manufacture and supply the gas. In the dilemma the tenants are left destitute of gas, and worse, the roads on the estate are in darkness. The water, supplied, we are told, by the Chelsea Waterworks, is of good quality, and is laid on to every house, slate cisterns being provided in accessible parts.

The subsoil is marl and gravel, covered with a rich alluvial earth, a kind of soil ill-suited for dry habitations, unless artificially improved by concrete, which, we are informed, has been placed in all foundations to a considerable depth. Let us briefly describe the plan of laying-out; and here we cannot help regretting, considering the insignificant price paid by the Company for this swamp of forty acres, that so many dwellings have been crowded together. Economy has certainly been carried by the Company to an extreme that is to be deplored, when we think of the land itself and its low position and price. There is a road skirting the estate all round, and no fewer than eight or nine other roads intersecting the land and cutting it up into strips varying in width or depth from about 100ft. to almost nothing in some parts. These strips or plots are again divided longitudinally, so as to obtain two rows of tenements, each row having a depth of about 50ft. or 60ft. There may be a few lots a little deeper, but they are exceptional to the rule. We have said that various railways shut the land in on the north side; on the south the estate is all but closed in by the rising ground of Lavender-hill and the acclivity of the Wandsworth-road, from which the estate is directly approached on the north side by three new roads which cross the estate, and are intersected by the longitudinal roads already mentioned. The centre of the estate is at present open, and a site of about 300ft. by 200ft. is to be devoted to an open recreation ground, to be termed “Brassey-square.” Close to this is a site for a lecture-hall, library, baths, &c., and also for co-operative stores—one regulation of the estate being that no public-house should be opened on it.

Now, a division by three roads instead of four would have given to each dwelling a little back-yard and a trifle more breathing-room, while the reduction in the number of houses would not have been a great loss. While the land still remains partly unbuilt we would suggest a less restricted allotment, both for the sake of health and comfort; and we are disposed to think that the 1,200 houses the directors have pledged themselves to carry out will be a species of overcrowding scarcely warranted in such a part. Less crowding would also allow a little more garden-ground in front as well as in the rear, and would induce an emulation among the occupants to keep their borders neatly or to lay them out with shrubs or flowers. No inducements of the kind can possibly exist where the tenant is confined to a few square feet of back-yard, scarcely the size of a room—save, indeed, the more probable use of converting it into a refuse-yard.

But let us go into one of these little houses and examine the arrangements. The houses are built in close-set rows, the entrances being in pairs, and the offices at the back forming semi-detached projections in the ordinary manner. Taking a first-class dwelling—and let us say here there are four classes of houses—we enter a passage of about 3ft. 4in. wide, leading to a front room about 11ft. 3in., by 11ft. 4in., exclusive of a small bay-window. This room is fitted up with dwarf cupboards and an enamelled slate chimney-piece. The back room is about 12ft. by 10ft. 9in., but the latter dimension is got by unduly pinching the back passage and the space between the first step of staircase. Passing through the main part of house, we enter the kitchen, intercepted by a small lobby opening into the back-yard, the other end forming a well-shelved larder under the stairs; the kitchen

is about 9ft. by 8ft., and is provided with kitchener and dresser, and opens into a small scullery or washhouse, fitted with a galvanised-iron copper and a sink. Coals are provided for under the stairs. Upstairs there are three bedrooms over the rooms below, besides a small back room as bathroom, with a tap. The rooms are well lighted, and ventilated by valved air-gratings, which are inserted over the doorways and in the external walls of every room, and they communicate with air-flues in the outer walls. The floors are also ventilated. The joinery and fittings in this and the other classes of house are certainly of a praiseworthy description, and put to shame, in some instances, the work of houses of greater rental and pretension. The woodwork is grained and varnished. The rent of these “eight-roomed,” or, rather, seven-roomed, houses is £26—higher than we expected to find on this estate. Including the rates and taxes, the total annual cost will, we think, be above the figure the ordinary artisan can afford.

Let us now enter a third-class house; the arrangements we find much the same; the front room is smaller, 11ft. 10in. by 10ft. 6in.; the back 12ft. by 9ft. 6in. The kitchen is smaller, and upstairs, the back bathroom is omitted; in other respects the details are the same, though of a less expensive quality—still good and sufficient. There are three bedrooms. The rental of this class is 6s. 9d. per week, including rates and taxes. We think this, and the next, the 4th class, let at 5s. 9d., by far the cheapest. In the last class the back room may be used as a sitting-room or kitchen; it is a large room, provided with suitable range, cupboard, shelves, and the staircase leads from it to the upper floor, which has three bedrooms. The 2nd class houses, let at 8s. per week, have all the characteristics of the first-class houses.

Generally, the construction appears to be sound; the walls are of brick, and the timbers of those we inspected in process of erection sufficient. That a rather different arrangement of plan could have been adopted is a question too late to discuss now. We should have preferred semi-detached blocks in some parts. As they stand they are cramped; the frontages are not sufficient, and the arrangement of stairs and back offices might have been better. There are defects, but they are chiefly the defects arising from a too niggardly use of land. The roads are narrow; the foot-paths, though well made of tar and gravel, are narrow—we mean in regard to the anticipations of those who looked upon the estate as one in which a great deal more of the rural element might have been blended. Still there are many redeeming points; the houses seem to be all taken by tenants who regard their own cleanliness and sobriety. There is a quiet and pleasing air of comfort about the place. The windows are provided with spacious sills, on which some devotion is made to Flora, and the forecourts display a very tidy appearance. The doorways are in some cases protected by corbelled gables, though in the best class houses this is rather strangely omitted.

There are some points of architectural character we would just say a few words about. As a rule the houses are of white stocks, relieved by red brick corbels under eaves, black and red arches and strings in the better dwellings, and by moulded cement lintels, window-shafts, and dressings in the others. Why the 1st class dwellings should have the less amount of decoration we cannot see—perhaps there may be, however, a reason. But there is a good deal of ornamentation, not only out of character, but out of place, and which the Directors would have done wisely to have thrown into the shape of greater accommodation and space.

Laudable endeavours to break the monotony of the houses have been attempted by the architect, in the form of projecting oriels and towers, capped by embattled parapets and steep-pointed roofs. They certainly to a



degree take off the weariness of a long street; but they would have been equally as effective for this end if there had been less fancy-work about them. We well know that in houses of this stamp a little decoration is wanted to take off the tedium of sameness, which in a larger house is not so much needed, and it is somewhat difficult to throw into a row of such houses that kind of variety sought; but at the same time this can never be done by what we call a petty or fussy kind of ornamentation, as in the cement brackets and little supported shafts introduced to carry door-gables; the bedizened parapets and corner vases placed over the centre houses of Shaftesbury-terrace; in the centre plaster flowers and rich cornices of some of the little rooms, which would have been better avoided, and only serve to give them an air of littleness both real and by implication.

More than half the estate is already built and occupied, and we are informed there is a continual influx of comers, both as tenants and purchasers.

From the official report we learn some hundreds of houses have been built, and about 300 houses are in process of erection. Most of these, we are informed, have been let or sold. At Birmingham the company have purchased estates, and are building upon them, though we do not know with what success. At a recent meeting a dividend of 6 per cent. was declared, leaving a balance of £2,734; and the estimated value of the Shaftesbury estate, made by the company's own surveyor, is placed at £130,922. It appears the expenditure during the past year has been very heavy, though the share capital has increased largely since last year. The rent is said not to exceed one shilling and threepence per room weekly, the purchasers paying at the rate of one shilling and eightpence per room per week to secure the houses in fourteen years. This ceaseless exodus to the artisans' city, while it shows how great the demand is for dwellings of a moderate rental and good accommodation, does not necessarily show that the solution of the problem has been perfectly met. The objects of the company are stated to be "to assist the working classes to obtain improved dwellings, erected from the best designs at the lowest possible cost," and to assist them to become owners or purchasers of the houses they occupy. That much of this programme has been realised we do not deny; but before the company further develop their schemes at the estates they have acquired at Harrow-road and elsewhere, we hope they will reconsider their plans with a view to eliminate the intimated objections.

#### FACADES.

ONE of the distinctive faults of our architecture is to be found in the want of a connection between the internal construction and the external façade. We lose now the constructional expression found in the half-timbered structures of the sixteenth and seventeenth centuries; the constructional division of floor-levels and supports, which became outwardly expressed in the façade, and as found in several instances of Old London architecture, as in Gray's Inn-lane, and notably in some of the old timbered buildings still remaining in Great Queen-street and in other of the old quarters of London. Some of these instances are very *apropos* of what we are especially alluding to; namely, a constructive expression as evinced in the façade, and there is no forced make-shift or concealed expression arising from the desire to make the outer shell of our buildings more substantial to the eye than the inner construction justifies. We have lately been struck with this anomaly of our modern buildings, more by a comparison with others of a remote era. The total want of truthful expression, for example, in a building used as a factory or a set of workshops, and which displays outwardly all the repose and

massiveness of monumental architecture or expression, is too evident to need much argument. We can, at least, give such a building a character of its own without being at all led into such a kind of expression. In such a structure, quantity of light, heavy flooring, and substantial support, are necessary, and we must seek to attain those objects directly by giving large windows and massive piers. But some will say two such ideas are hostile. If we make our windows wide our piers must be small. This is not necessary. We are not compelled to show a heavy brick or masonry pier between each pair of windows. These latter may be equally well and better placed in pairs or in rows of four, five, or more, and the piers placed at such intervals, according to the extent of the front. The intermediate framework and supports can be of iron stanchions or wood, and kept back from the outer face of the piers, which can then be made as massive and as thick as circumstances require. Substance and strength can then be combined with ample light, and an expression attained eminently suitable to the building. Southwark-street, Victoria-street, Cannon-street, &c., show some good types of this arrangement, though not developed to the extent it might be. Some of these buildings look too monumental; the piers, though treated in the manner spoken of, are often too numerous and closely set.

When we come to ordinary domestic buildings, the difficulty of exhibiting externally the internal structure is perhaps increased in certain conditions; but still we have certain structural features that may be expressed. Floor levels, the predominance of height, and the relative importance of apartments, ought to be visibly shown; and this trait characterises that kind of architecture in which the carpentry ideal prevailed. Greek architecture derived, it has been supposed, its special peculiarities from such a model, and certainly not from a rock-cut temple, which some have imagined. Referring to the celebrated tomb of Beni Hassan, we find unmistakable evidence of such a prototype in the entablature and in the projecting cornice, which show the ends of rafters cut in the rock corresponding to the mutules and guttæ of the Greek cornice. That timber construction helped the Greeks to model their ornaments cannot be doubted, however great Egyptian and Assyrian influence may have been.

But our modern architects seek no such analogy; they make their brick external cases as if there was nothing behind; they seldom accentuate their floors, and the windows are so placed as to give effect only to the wall in which they are placed, i.e., there is seldom enough skill displayed in working out both section and elevation, *pari passu*. The one is too frequently studied without the other. In this respect the half-timbered erections may teach us some useful lessons. Take, for example, Sir Paul Pindar's house, Bishopsgate-street. Nothing can be more happily arranged than the front of this old house, with its projecting circular oriel and the side windows. Both, in fact, form a compound plan or bay canted out from the face of wall. Then again the horizontal divisions are well marked; we can see externally the levels of floors, which are marked by richly moulded and dentilled cornices, the dado level which becomes that of cills of the windows, underneath these being richly-carved panels divided by the continuation of the mullions. Then there are the transoms carried throughout the façade as string-courses, the whole combining to form a framework at once highly constructive and architectural. East of St. Clement's Church, on the south side of the Strand, there are four houses probably of as old an age, where these characteristics are happily shown. Two of them appear in a rather rickety condition, but they exhibit the same marked division of façade corresponding to the internal apartments. The windows are well proportioned, the timber mullions or

uprights being continued, but broken at the floor levels by well-designed dentil cornices which break round them, and in one case the cornice has a pedimental centre over the middle light. The wall-piers are also panelled between the timber studwork, and the panels and dados are in one case highly relieved by some good carved mouldings. Thousands pass the houses in a day, but few, probably, have noticed the good proportions of the grouped windows, and the exquisite design of these old house-fronts. There are many other examples in better condition in some of the older streets that would also well repay study, as showing how windows can be dealt with in a sensible and attractive manner, by being combined, having a centre wide, and two narrower side lights; how cornices and string-courses may be dealt with to give expression to a façade, instead of obliterating and telling a falsehood on the face of it, and especially how the features of a façade may be connected together, instead of being placed at random in a wall, which gave rise to the phrase of "hole-in-the-wall" architecture so conspicuous in quasi-Classic buildings of half a century ago. We will describe a few other examples in another article.

#### CURVED LINES IN ARCHITECTURE.

(FIRST PAPER.)

ARCHITECTURAL ornament may be said to consist chiefly in a judicious arrangement of certain curved forms employed either as mouldings or carvings, so that in no buildings either of ancient or modern times which have any pretensions to architecture are curved lines entirely absent. The architects of ancient Greece paid the greatest attention to the mouldings of their cornices, the entasis of their columns, and the spirals of their volutes, much of the beauty of their edifices being derived from the great care bestowed by them in designing these features, as well as all the other details of the several parts; and it is to the absence of this care on the part of modern architects that the inferiority of their works is greatly owing. In ancient work we find that a variety of curves was used for decorative purposes, whereas, in those of the present day, the straight line and the circle seem to be the only recognised forms, although the appliances which are now possessed for delineating curved lines are far greater than formerly. Undoubtedly the circle is a valuable curve for many purposes of architecture, but its uniformity of curvature renders it unsuitable for the outline of mouldings except in small beads or hollows; in fact, the circle was but little used by the Greeks except for the plan of their columns.

Among the most valuable of curves for architectural purposes are those known as the conic sections, namely, the ellipse, hyperbola, and parabola, the two former of which are capable of infinite variety in outline. Whether these curves were actually known to the ancient Greeks is somewhat doubtful, as no treatises on them are known to have existed before the second century before Christ; but there can be no doubt that the outlines of many of their mouldings present a very close approximation to one or other of the conic sections, and the probability is that the curves themselves were known and used long before their mathematical properties were investigated. In the present paper we shall confine ourselves to the examination of these three curves, and to pointing out some of their applications to the work of the designer.

The first thing to be considered in the practical application of curved lines is the mode in which they can be drawn with facility, and without requiring any great amount of mathematical knowledge on the part of the draughtsman; and also that no instruments beyond those in ordinary use in an architect's office should be required for



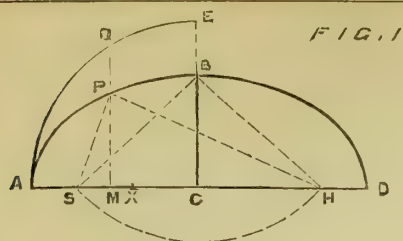


FIG. 1

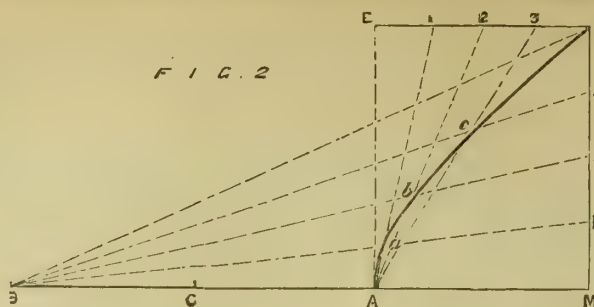


FIG. 2

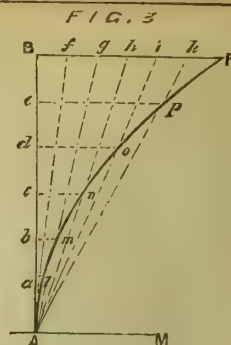


FIG. 3

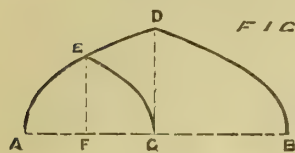


FIG. 4

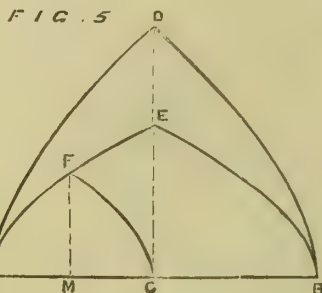


FIG. 5

FIG. 6

FIG. 13



FIG. 12

FIG. 9



FIG. 7

FIG. 10

FIG. 11



their delineation. Special instruments for delineating the conic sections have been invented, but are seldom used except for drawing ellipses of large size. We shall therefore show how these curves can be got out with sufficient accuracy for the purpose of the architect with the ordinary appliances which are ready to his hand.

The ellipse, half of which is shown by Fig. 1, can be drawn in several ways, the simplest of which is by means of two pins placed at the foci S and H, and connected with a loose string of length equal to AD, the major axis. We suppose that the length AD, and height CB, are given, and it is required to draw the ellipse having those proportions, C being the centre of the line AD, and CB at right angles thereto. From B as a centre with a radius equal to AC, describe a circle cutting AD in S and H, and at these points fix the above-named pins, to which a string is attached, and which, on being tightened, is equal in length to AD. Keep the string tight by means of the point of a pencil, and starting from A move the pencil towards B, then the curve will be marked out. Another method, which requires the use of only the ruler and compasses, is that of finding a number of points on the perimeter, and sketching in the curve, or an approximation thereto, by hand through those points. Take any point X on the major axis between C and S, and with S as a centre and AX as radius, draw a circle; then with H as a centre and DX for radius, draw an arc cutting this circle in P, which will be upon the ellipse; so that for every point taken between S and C we can find a corresponding one on the curve between A and B.

Another method is by use of what is called the circumscribed circle; from C as a centre, and with CA for radius, draw the circle AE; from any point Q on the circle let fall a perpendicular, QM, to the major axis; let CA or CE represent 100 on any scale, and CB 100 on another scale; then if we find what MQ measures on the larger scale, and measure off MP by the smaller one, we shall have a point on the ellipse; and by drawing a number of vertical ordinates we can by use

of these two scales obtain as many points as we please on the curve.

The hyperbola, a portion of which curve is shown on Fig. 2, can only be drawn by continuous motion by means of an instrument made on purpose; we shall therefore confine our attention to the method of finding points on its perimeter. Let A be the vertex of the curve which cuts the "axis" BCAM at right angles at that point, or its tangent AE is perpendicular to AC; let C be the "centre," CB being equal to CA; suppose it required to draw the curve through some point D, draw the line MD at right angles to MA, dividing it into any number of equal parts, as 1, 2, 3, and draw the lines B1, B2, B3; also divide ED into the same number of equal parts, and draw the lines A1, A2, A3, intersecting the former lines in the points *a*, *b*, *c*, which will be upon the hyperbola, and through them the curve can be sketched by hand.

The parabola (Fig. 3) can be drawn by continuous motion in a manner similar to that employed for the ellipse, by means of a T-square and drawing-board, a string being attached at one end to a pin at the focus of the curve, and at the other to the extremity of the square, and kept tight by a pencil pressed against the edge of the square. The method of points will, however, be found easier by the draughtsman, which we shall proceed to describe. Let AM be a horizontal axis, A the vertex where the tangent AB cuts the axis at right angles, P any point through which the curve has to pass. Draw BP parallel to AM, and divide it into any number of equal parts at *f*, *g*, &c.; draw the lines Af, Ag, &c. Also divide AB into the same number of equal parts at *a*, *b*, &c., and draw horizontals cutting the former lines in the points *l*, *m*, *n*, &c., which will be upon the parabola, and the curve can be sketched through them by hand. The larger the number of points taken the more accurate will be the curve.

Having shown how these curves can be most readily described, we will now point out some of their applications to the purposes of the architect. Fig. 4 shows how the ellipse can be employed to form the contour of a Tudor Gothic arch, AD and BD being similar por-

tions of the same ellipse in reversed positions, having CD for the height or versed sine of the arch. If an arch of higher pitch is required the arcs AE, EC, can be used, or any other portion of the curve.

A similar use can be made of the hyperbola (Fig. 5), AD and BD, AE and BE, AF and CF being similar arcs of the curve reversed so as to form a pointed arch. The use of this kind of arch was not confined to the later period of Gothic architecture, but was employed in arches of the Early English or thirteenth-century Gothic, as in those of Westminster Abbey. The usual mode of drawing these is by means of four arcs of circles, and hence the arch is generally termed the four-centred arch; but this is a very bad imitation of the mathematical curve, as the change of curvature is sudden at the point where the two arcs of different curvature meet, instead of being gradual, as in the true curve, and consequently a crippled appearance is given to the arch, to conceal which elaborate carvings and mouldings are worked upon it.

The hyperbola will form the ovolo moulding used in the cornice of Grecian architecture (Fig. 6), any variety of form being obtained by changing the "eccentricity" of the hyperbola from which the arc is taken.

A segment of an ellipse is also well adapted for the same purpose (Fig. 7), especially if a greater amount of curvature is desired in the flatter portion. The ellipse is also the proper curve to use for a hollow or "cavetto," as in the base of a column (Fig. 8); it is also adaptable to the flutings of columns where great depth is not required (Fig. 9), and is far preferable to the arc of a circle generally used. For the projecting torus and other mouldings of Gothic architecture (Figs. 10 and 11) the ellipse might often be used in preference to the circle, the usual mode of drawing the curve shown in Fig. 10 being by two arcs of circles of different radius.

When a curved entasis is given to a column the contour is generally a portion of a very large ellipse taken at the end of the major axis, and is drawn on the principle of an ellipse being a circle, of which all the ordinates are altered in one given proportion. The parabola can also be employed for the same purpose, but as



it closely resembles an ellipse, it is impossible to distinguish any difference in appearance where the curvature is so slight.

For the entasis of Grecian columns, the hyperbola appears to have been the curve used; but whichever is employed, the actual deviation from a straight line should always be but slight, and merely sufficient to destroy any appearance of hollowness in the column.

There are many other decorative features in which these curves can be advantageously employed, as in forming leaf ornaments (Figs. 12, 13), in which two equal and similar curves are turned reversed ways, the ellipse being used in Fig. 12, and the hyperbola in Fig. 14.

In our next paper we shall notice some other mathematical lines which are valuable to the architect, as the ogee or curves of contrary flexure, and also the spirals.

## THE CONSTRUCTION OF WAREHOUSES AND WORKSHOPS.\*

(Continued from p. 456.)

SOME trades require more light and ventilation in the warehouses and workshops than others, and the architect or engineer, in regulating the number and size of the windows, will conform to the requirements of the trade for which the buildings are to be erected, never forgetting, under any circumstances, to let one set of the windows face as nearly north as possible, and whenever but little light is required for the purposes of the trade for which the buildings are designed, he will make every provision for enlarging the windows or increasing their number in case any necessity should arise for doing so. To insure a good light and thorough ventilation it is most desirable to have two sets of windows in each compartment, the one set being opposite the other, whenever such an arrangement is possible.

The openings for the windows and the doorways should be arched over entirely with brickwork, the use of stone of any kind in the arches being avoided. The action of fire is very rapid on stone of every description, and particularly so on all sorts of limestone. The brickwork in the arches may be of stock bricks, there being not the slightest necessity for the use of firebricks therein.

To prevent the flames acting on the flooring of the compartment above, when it is composed of timber, for as long a period as possible, it is desirable that the tops of the openings for the windows and doors should be kept at as great a distance as is convenient, say to the depth of from 2ft. to 2ft. 6in., below the joists. The windows should be provided with close-fitting shutters. The shutters fixing externally should have special means for closing and securely fastening them from the outside. With these precautions and tightly-fitting doors, those in attendance would, in case of a conflagration, be enabled to close and readily secure both the doors and window-shutters, and thus exclude all but a very inconsiderable amount of fresh air from the apartment.

With doors and window-shutters of a good construction closed, and an airtight flooring above and below, the effect would be that all the oxygen in the air of the compartment itself would be consumed in a very few minutes by a fire insignificant in extent. The fire thereafter would have to live on the oxygen contained in the air that might be drawn through the crevices. The floors being of concrete, and the doors and windows, few in number, well fitted and closed, it is difficult to comprehend how a fire could exist for any considerable period under such circumstances, the more so when we remember that that great enemy of fire—carbonic acid gas—is being formed during the whole time combustion is going on, and that it cannot make its exit from the compartment.

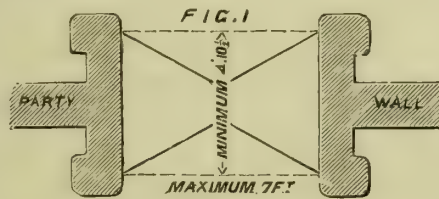
Experience teaches us that we should be assuming too much in reckoning on the window-shutters being closed immediately on the outbreak of a fire; therefore it is that we advocate the keeping of the tops of the windows from 2ft. to 2ft. 6in. below the joists of the flooring of the compartment above, when that flooring is composed of timber. Our reasons we will explain hereafter. It will be seen we have

spoken of close-fitting doors and window-shutters, but have not stated the material of which we would have them made, holding, as we do, opinions which have hitherto been considered peculiar; but Captain Shaw's letter in the *Times* of the 23rd February, 1874, headed "Wood versus Iron," will embolden us to fully explain the views we entertain on the subject of the construction of doors and window-shutters for warehouses and workshops as well as those on beams and story-posts. After having discussed these subjects, we propose to explain that which may appear a moot point to some practical warehousemen who may read this article, viz., the form of construction that shall thoroughly isolate each compartment, and yet permit the free working of any number of full-sized warehouses, as though they had no party-walls.

In the event of a fire breaking out in a compartment of a warehouse built on the principles advocated, the heated gaseous products of the combustion, commonly termed smoke, would ascend, roll along the underside of the roof or flooring of the compartment above, and very quickly form a stratum of gases antagonistic to the existence of flames, and of such a thickness (the tops of the windows and of the doors being low) as would prove by no means a contemptible source of protection against fire for the materials in the superstructure.

When a fire occurs in a compartment of a building in which the roof and the floorings are not so constructed as to be airtight, the smoke, hot and light, quickly forcing its way through the crevices, leaves the materials forming the superstructure of the compartment an easy prey to the flames, and if, further, there be, as is only too generally the case in warehouses and workshops built to the designs more generally in vogue, a large opening in the flooring above, such as is necessary for a staircase or trap-door, the smoke still more rapidly finding its way into all the other compartments of the building, not only immediately partially destroys the value of the goods stowed therein, but at the same time dries those goods, and thus prepares them for total destruction on the approach of the flames, which now more fiercely rage, fed by the oxygen of the atmospheric air as it rushes to fill the space vacated by the ascending smoke.

According to the Act of Parliament known as the Metropolitan Building Act (which among other things prescribes that no building used for the purpose of warehousing goods shall have a greater capacity than 216,000 cubic feet), openings may be made in the party-walls separating buildings of the largest size, provided each of the openings be not more than 8ft. in height nor 7ft. in width, and be fitted with double sets of iron doors, the two sets of doors having a distance between them when closed equal to the thickness of the party-wall in which the opening is made.



Such are the conditions on which openings were made in party-walls, according to the Act of Parliament, but most of the London insurance companies not only insist on having the doors of iron, and in duplicate, but on there being a clear distance between them when closed of not less than 4ft. 10in. as is shown in Fig. 1, a plan of an opening in a party-wall, and of the extra walls and protecting doors as required by most of the London insurance offices.

We consider this increase of distance between the doors of thin sheet iron a very reasonable and proper requirement on the part of the insurance companies. Experience has forced on us the conviction that the flimsy structures of thin plate iron now in general use as doors to openings in party-walls prove worse than useless when called upon to resist the outrages of a fire of a moderate degree of fierceness, without the precaution has been taken of leaving a space of at least 4ft. 10in. between the duplicate set of doors. Doors of plate iron, made on the most approved pattern, will, when exposed to a, comparatively speaking, moderate degree of heat,

buckle and twist, and form passages for the flames to pass between them and their frames.

Good stout doors and frames of timber, properly constructed, with a view to resist the action of fire, would prove of infinitely greater service in resisting the action of even flames than the best constructed doors of thin sheet iron that have ever come under our observation. The frames of timber 4½ inches square should be wholly imbedded in a recess in the brickwork, and all the interstices between the timber of the frames and the brickwork should be filled in solid with cement compo. The doors, from 3 to 4 inches in thickness, according to the size of the openings, may be built with advantage, either of two thicknesses of timber laid diagonally, with or without a thin sheet of wrought iron or steel between them, as in cell-doors of prisons, or of single slabs of timber of the required thickness, 6 to 8 inches in width, grooved and tongued and bound together by ½-inch through-bolts of wrought iron.

Doors and shutters constructed on either of these plans are not liable to warp, and possess great strength, as well as power to resist the action of flames for a very considerable period of time.

Though by no means agreeing with the chief officer of the noble London Fire Brigade (Captain Shaw) in the deductions he appears to draw from the result of his experiment on the burning of the stanchion and beam of timber, of which he gave the particulars in his letter to the editor of the *Times*, before referred to, yet that result strengthens our old belief that a door of timber constructed on a plan adapted to the purpose is to be preferred for the purpose of arresting the progress of a conflagration to a door built of thin plate iron to the best design.

A very great point of safety will be gained if, in the contemplated New Metropolitan Building Act, there shall be inserted a clause absolutely prohibiting the existence of any opening in party-walls separating buildings of which the united capacity is upwards of 216,000 cubic feet. Such prohibition by Act of Parliament is the more necessary, as though most, if not all of, the London insurance companies go further (as has been shown) than the present Act of Parliament in their requirements as to the precautionary measures to be taken in the construction of the openings in party-walls, yet not one of the companies, so far as we are aware, has appointed agents to see that the doors are duly closed and fastened during the non-working hours of the day and night. Perhaps so to do would involve the companies in too great an expense; but whatever the cost, the companies ought to have the openings in party-walls of buildings the contents of which they insure examined say once in one, two, or three months, according to the nature and value of the goods insured, to ascertain that the doors are kept in good working order and free from lumber so as to be capable of being quickly closed in case of an emergency. The enormous risks the insurance companies run, in comparison with the amount of the premiums they receive, entitle those companies to have a clause inserted in the contemplated new Building Act to enable them to enter any sets of warehouse, subdivided by party-walls having openings therein, at any reasonable hour of the day or night, provided they have insured the buildings or the goods stowed therein. If by the contemplated new Metropolitan Building Act it will still be allowable to have openings in party-walls, then by all means let a clause in the Act also permit of the doors protecting such openings (those doors being compulsorily still in duplicate and placed as required by the present Building Act) being constructed of timber or timber and iron in place of all iron. The clause might with advantage be permissive, not compulsory, leaving the point to be adjusted between the owners of the property and the officers of the insurance companies.

## SCHOOL PLANNING.\*

THE above is the title of a little brochure which is an abstract of a paper read at the Social Science Congress, held at Norwich last year. It was the contribution of a lady, who has had many years' experience in the work of tuition.

\* "A Few Suggestions as to the Best Mode of Construction, &c., &c., for School Board and other Buildings Designed for Educational Purposes." Mills and Sons, Southsea.

\*By W. C. HOMERSHAM, C.E., in *Iron*.



It is accompanied by a neatly executed drawing, giving elevation, section, and ground-plan to scale.

The object of the author is to show the superior adaptability of a building constructed with a nave and transepts over all others for educational purposes. The arguments by which this view is supported are that windows being inserted in both sides of the building, direct sunlight and thorough ventilation are secured; that a building so constructed admits of a central entrance for officers and visitors, and separate external entrances for the boys', girls', and infants' departments respectively, and that it can be contracted or enlarged to suit the numerical wants of any district. A vitiated atmosphere not only operates injuriously upon the physical organisation, but produces a state of mental depression and irritation which should be specially guarded against in buildings designed for the education of large numbers of children congregated under one roof; for it is obvious that where these exist the mind cannot receive or even impart with comfort the most ordinary instruction. The author justly observes the windows should be fitted with blinds to moderate the direct sunlight, and those only opened which are opposite to the direction from which the wind is blowing, which could always be readily ascertained by having a weathercock attached to the building; and remarks, with equal truth, that the apertures by which fresh air is admitted should always be large, to enable the external air to commingle freely, and prevent the evil influence of those sharp currents which are created when it has to rush in through crevices or small openings.

There are some very sensible observations on the importance of due regard being paid to the acoustic properties of school buildings. The greater portion of elementary education is given *viva voce*, and must reach the mind through the ear. It is therefore important that the teacher's voice should give no "uncertain sound," and that his ears should not be deceived either as regards his own utterances or those of his pupils; yet to such an extent does this exist by the adoption of the open-roof system, which creates a perfect Babel of reverberations, that the Inspectors of Schools are constantly finding fault with the reading of pupils otherwise fairly or even well-instructed, whereas their reading would be quite equal to their other performances if the acoustic properties of the schoolroom were of such a character as to permit the circulation of direct sound-waves. To secure good reading, and a thorough understanding between teacher and pupil, the author insists upon the "flat ceiling;" and combating the objection on the ground of expense, remarks: "But it is only when two or more classes are to receive instruction in the same room that the sloping roof is a positive objection, as when the building consists of two stories, and the upper story is used for classrooms, excepting for the purpose of securing more equable temperature, the ceiling in the roof is desirable, rather than otherwise, because it utilises space." We commend the pamphlet to all interested in school buildings. It has been written with care, and is the result of experience. Its author carries out, in her own establishment, which is a high-class school of long standing, the principles she advocates for the schools of the people.

#### THE SANITARY LAW AMENDMENT ACT.

THE Local Government Board have published a paper explanatory of this statute, of which copies have been addressed to the various Boards of Guardians to enable them to perform the duties intrusted to them as the Rural Sanitary Authority. We make the following extracts from it:—"The first section of the Act clears up a difficulty which existed in reference to the character which the Board of Guardians filled when acting as the Rural Sanitary Authority. It having been contended that they were a distinct body when so acting, the section declares that the Rural Sanitary Authority is the same body as the Board of Guardians of the union or parish for or within which such authority acts, and that all statutes, orders, and legal provisions applicable to a Board of Guardians apply to them when acting as the Rural Sanitary Authority, except so far as any provision of the Public Health Act, 1872, relating to the acting or voting of a Guardian or otherwise, may be to the contrary. Henceforth, therefore, the Guardians, when acting as a Rural

Sanitary Authority, will be subject to the statutes and orders hitherto applicable to them in their general capacity; but the Guardians who represent parishes and parts of parishes within Urban Sanitary Districts will still be excluded from taking part in the proceedings of the Rural Sanitary Authority, as provided by the Public Health Act, 1872 (35 and 36 Vic. c. 79.) As this difficulty is cleared up, the Board of Guardians will doubtless make arrangements for the discharge of the business arising out of the Sanitary Law distinct from that relating to the Poor Law. The 29th and 30th Vic. c. 90, section 16, enables the chief officer of police, in any place within the jurisdiction of a Nuisance Authority (and therefore of a Rural Sanitary Authority), by and under the direction of the Local Government Board, on its being proved to their satisfaction that such authority has made default in doing its duty, to institute any proceeding which such authority might institute with respect to the removal of nuisances. That section, however, made no provision for the expenses of the police officer. This is now remedied by section 19 of the new Act, which entitles him to recover his expenses from the authority in default. The 21st section requires every Rural Sanitary Authority who shall have been invested with the requisite powers, and when the Local Government Board by order so direct, to make due provision for the proper cleansing of streets, the removal of house refuse from premises, and the cleansing of earth-closets, privies, ashpits, and cesspools within their district. The section imposes a penalty of 5s. a day upon the Sanitary Authority who fails, without reasonable excuse, for seven days after notice from the occupier, to remove the refuse, or to cleanse out the places above referred to. Some doubts as to the power of Sanitary Authorities with respect to the acquisition of lands, easements, and rights, are removed by section 31, which enacts that the Lands Clauses Consolidation Act, 1845, may, when put in force under any provision of the Sanitary Acts, be applied to all lands, easements and rights in, over, or upon land, whether situated within or without the district of the Sanitary Authority. Section 33 enables any Sanitary Authority, subject to the provisions of the Sanitary Acts, to buy up any watermill, dam, or weir which interferes with the proper drainage of or the supply of water to its district, and, for the purpose of supplying its district with water for drinking and domestic purposes, to purchase either within or without its district any land covered with water, or any water, or right to take or convey water. The Lands Clauses Consolidation Act, 1845, is incorporated with this section, but the compulsory powers cannot be exercised without a provisional order of the Local Government Board. An alteration of the law as regards the powers of borrowing by Sanitary Authorities is effected by section 36. That section provides that the money borrowed shall not at any time exceed in the whole with the balances of all the outstanding loans of the Sanitary Authority under the Sanitary Acts, the assessable value for two years of the premises assessable within the district. The time for which the money is to be borrowed must not exceed 60 years, but loans from the Public Works Loan Commissioners can in no case be advanced for more than 50 years. Several new provisions relating to by-laws are contained in the Act. Section 44 extends the power of making by-laws to roofs, foundations, and spouts on the outside of buildings, and for the purposes of health as well as for the purposes of stability and protection against fire. The following objects, for which regulations may be made by the Sanitary Authority, are added to those contained in the former Act—namely, the ventilation of rooms (passages only having been previously provided for), the paving and drainage of premises, the separation of the sexes, and the notices to be given and precautions to be taken in case of any dangerously infectious or contagious diseases. The 48th section demands particular attention. The Rural Sanitary Authority have power to make by-laws in respect of certain matters under the Sanitary Acts, and may be endowed with additional powers for that purpose by special order of the Local Government Board; but there are no provisions in the previous Acts which prescribe the mode of making or publishing such by-laws. This omission is now supplied. The Rural Sanitary Authority proposing to make any by-law must cause a copy of it to be deposited in the Boardroom for one month before applying for confirmation. It must be open to inspection, and copies must be furnished and notice of the application for confirmation given.

In these respects the provisions applicable to by-laws by Urban Sanitary Authorities (for which reference should be made to 11 and 12 Vic. c. 63, section 115) are to be followed. When confirmed, the by-law is to be printed; a copy is to be hung up in the Boardroom, and a copy is to be transmitted to the overseers of the parish to which it applies, to be deposited with the public documents of the parish, and to be open to the inspection of every ratepayer. The clerk of the Rural Sanitary Authority is to give a copy of the by-law to any ratepayer of the district upon application. Section 49 requires the keepers of common lodging-houses and the owners or occupiers of slaughter-houses to affix on the outside of the premises a notice with the words 'Registered Lodging-house' or 'Licensed or Registered Slaughter-house,' as the case may be, and imposes a penalty not exceeding £5 for default, with a further penalty of 10s. for every day the neglect continues after conviction. Section 50 provides that, upon representation to any Sanitary Authority the water in any well, tank, or cistern, public or private, or supplied from any public pump, and used, or likely to be used, for domestic purposes, is so polluted as to be injurious to health, such authority may apply to the Petty Sessions for an order to remedy the evil. After summons, the Justices may make an order directing the well, tank, or cistern to be closed, or the water to be used for certain purposes only, or providing otherwise, as shall appear to them to be requisite to prevent the use of the water for drinking purposes. The Justices may also cause the water to be analysed at the cost of the authority. When an order is made for the removal of a sick person to a hospital, under the 29th and 30th Vic. c. 90, section 26, some difficulty has arisen in consequence of that section referring only to a hospital within the district. It is now provided in section 51 of the present Act that every hospital declared by the Local Government Board to be within a convenient distance of the district of the authority shall be deemed to be for this purpose within the district. Another difficulty existed in consequence of the omission, in the same section of the 29th and 30th Vic. c. 90, to state to whom the order of the Justice should be directed; that difficulty has been removed by providing that it may be directed to a police or other officer. Moreover, every person wilfully disobeying the order of the Justice under that section, or obstructing the execution of it, is rendered subject to a penalty of £10. By the 53rd section the right and power of complaint given by the 13th section of the 23d and 24th Vic. c. 77, one of the Nuisance Removal Acts, to any inhabitant of any parish or place, in reference to nuisances on private premises, is extended to nuisances on public premises, and may be exercised by any person aggrieved. By section 54, the 26th and 27th Vic. c. 117, section 2, which relates to the inspection of articles of food, is extended to milk, and the proceedings against offenders are facilitated by providing that the Justice who is empowered to convict the offender need not be the Justice who ordered the article to be destroyed. Section 55 further extends the powers of that Act by enabling entry, inspection, and seizure to be made upon premises where there is reason to believe that unsound food is kept or concealed, the previous statute only applying where the food is openly exposed or deposited, or kept in preparation for sale. Section 56 provides for the punishment of persons who, on the letting of houses, knowingly make false representations with respect to infectious diseases therein, by rendering such persons liable to imprisonment or a penalty not exceeding £20."

#### THE NEW PARIS OPERA-HOUSE.

ACCORDING to the *Pall Mall Gazette*, this sumptuous and ambitious house, which will be completed within a few weeks, may be presumed to embody the most approved principles of theatrical arrangement. Its designer, M. Garnier, has studied all the newest monuments of the kind in Europe, and by the aid of "logical" arrangement has contrived to satisfy the demands of a foreign audience. A great national theatre, subsidised magnificently, requires a building for its "administration," control, &c., for its schools and practices, great galleries for promenade, the indispensable foyer, where half the audience may assemble, a sort of



palace for the comfort of the head of the State, and vast accommodation for scenes, scenic machinery, ballet, choruses, and "first subjects," whose habits and tastes are of a luxurious kind. M. Garnier has emphasised his various departments externally, and the flaneur on the Boulevards can note the block in front which expresses the foyer and halls; the cupola which signifies the salle or audience portion; and the huge box-like structure which rises behind, and betokens the stage and the realms above the stage, lofty enough to allow of a whole scene being raised without folding. This emphasis, however, is faulty; it destroys the unity of the building, and produces the effect of so many distinct buildings joined together. The arrangements for entrance and for the proper classification of the audience have exercised the architect to no small degree, and his wish to be logical has led him into distinctions too refined. His conviction that the front of a theatre should, like a church, be dignified with an imposing flight of steps, naturally makes the setting down there of persons who arrive in carriages and in full dress an impossibility. Carriages therefore pass round to the side, and beneath a covered pavilion. M. Garnier's side arrangement is, however, a mistake; for the "carriage company," after making its way through vault-like passages, has to climb a comparatively mean flight of stairs before it can reach its own proper staircase of honour. There is also a capriciousness in these different levels—foot-passengers mounting by a flight of steps from the street to the plane of the stalls; the full-dress company entering from the level of the street, and ascending three flights to gain the boxes; while the "chief of the State" is transported in his carriage up an inclined way, which allows him to be set down on a level with his own box. These arrangements seem a little forced. The foyer is a brilliant hall, a little too narrow for its height—an elevation at which the much-talked-of Bandry pictures produce little impression. The "house" itself is a noble hall, beautifully proportioned, and appearing nearly circular. The spectator, as he looks from the grand tier, notes the general airiness and lightness, an effect produced by all the seats being laid out in balconies, the boxes being behind. Thus the occupant of every seat is in full view, while his box behind forms a sort of little open salon. The whole is one mass of gilding from door to ceiling, and recalls the decoration and arrangement of the "Monnaie" at Brussels. Oak is used abundantly for the doors and framework; a rather too austere material. The chandelier is used for illumination. On the whole, beyond the harmony and beauty of its shape, there is nothing very novel in the treatment of the salle.

The regions below the stage are carried down to a depth sufficient to engulf any palace or cathedral which might rise to the height of the whole scene. Looking aloft, the lines of cordage and "flying bridges" crossing and recrossing are bewildering. It is this that has spoiled the building externally, supplying it with the huge stone chest which rises with such disagreeable conspicuousness. Few people have a conception of the vast space thus devoted above and below to stage arrangements in the great theatres of Europe. Here it is possible to descend three and four stories below the stage. From these vast depths will hereafter rise huge and towering structures which straitened accommodation of old times rendered impossible. The scenes and side-scenes will be arranged after the usual French fashion; for, though many new and ingenious schemes were laid before the commission of direction, one of which—that of suspending the side-scenes and allowing them to travel on rails aloft—had nearly been adopted by the architect, it was found that the old clumsy system of supporting them against "masts" and on "chariots" left the stage free and clear for the artists, which any fixed machinery did not. Nothing can be more lofty or airy than the corridors or the fine room at the back, a sort of foyer for the dancers, which can be thrown into the stage. Every "first subject" has a little suite of two rooms, which, as is the custom in France, will be richly furnished and decorated according to the taste of the occupant, or according to the richness of the allowance often made for the purpose. They contrast favourably with the rather cell-like rooms with which first subjects are indulged on this side of the Channel. The crowd of dancers dress in large long rooms. Even the question of the curtain was dealt with by M. Garnier on æsthetical

principles. After long discussion, he determined that a mimic curtain, with folds, &c., painted on canvas, is the true form. A genuine curtain shows creases, collects dust, and grows shabby; while a landscape belongs to the regions behind the curtain.

The completion of this edifice before the New Year will tax the energies of all concerned. A few days since matters had advanced thus far: the dome was painted and gilt, as were also the various balconies down to the second tier. The flooring of the salle was laid, and the divisions of the boxes were in their place. All the plastering appeared to be done; the roof of the foyer was decorated, and the superb marble chimney-pieces were in progress. The stage and stage machinery is all but complete. In short, the painting, fitting, and furnishing has all to be done; and ten weeks seems but a short time into which to compress so much work. No doubt it will be apparently completed by the day fixed, though it will take many more months before it can be really finished. On the whole, the success of this costly and pretentious structure will scarcely reward the thought and pains expended on it. The Classical and stately Bordeaux Theatre, with its fine colonnade and statues, will probably retain its rank as the finest house of its kind in France.

#### UNIVERSITY AND TOWN IMPROVEMENTS AT CAMBRIDGE.

VARIOUS improvements have been effected of late in connection with the University of Cambridge, and several town improvements are either in progress or in prospect. The following particulars are abridged from the *Cambridge Chronicle* :—

The improvements at the *Fitzwilliam Museum* are of a very splendid and costly description. The Museum, mainly built from the designs of Basevi, has a very fine and lofty Corinthian portico. The entrance-hall occupies an area of 70ft. by 40ft., and here most extensive and important works are in progress, at a cost of £20,000. To beautify the hall, tons of marble of various hues have been worked up; the doors are surrounded with alabaster and marble, and a floor of Roman tiles has been laid down. In the hall will be placed a very fine statue, by the late J. H. Foley, R.A., of the Prince Consort, which will be placed immediately facing the principal entrance, and between the two marble staircases. The works are being carried out from designs by Mr. E. M. Barry.

The Chapel of *Gonville and Caius College* is being redecorated by Messrs. Heaton, Butler, and Bayne. The fine old oak roof has been cleansed of the paint which has covered it for centuries, and the woodwork has been restored where found necessary. In the choir portion the old (cherub) carving has been knocked off, and in substitution angels have been painted on the panels. On the east wall, over the arch, appears a small Latin cross, together with representations of the vine and the four Evangelists, whilst the decoration of the wall there consists of flights of doves. Each of the remaining fourteen rows of panels in the roof from the choir contains a carved cherub in gilded rays. The old cornice has been restored, partially gilded, and otherwise decorated with the rose and pomegranate. The decoration of the walls is of a diaper pattern, with lilies and roses, the superdado containing emblems of the Virgin Mary. The apsidal termination, with its stained glass and mosaics, is not yet completed, nor have any of the contemplated works of decoration of the fine Norway oak screen or the organ front been commenced. The decorators have several months' work before them.

At *Downing College* the foundations are just being put in for a block of buildings on the north-east of the spacious quadrangle. The new buildings, which will be erected in a style in keeping with the other, and especially the opposite, part of the College, will provide eight additional sets of rooms, besides lecture and professors' rooms, libraries, &c. Alterations are also contemplated in the present north-west block, where (besides some additional rooms) the end elevation will be made to correspond with the proposed elevation in the new block. The work, which will involve an expenditure of £20,000, is expected to be completed in twelve months. The architect is Mr. E. M. Barry, R.A., and the contractors are Messrs. Perry & Co., of Tredegar Works, Bow.

At *Trinity College* some elaborate decorations have been completed in the Tudor Gothic Chapel

erected by the Sister Queens, but there still remains something to be done. The figure of Newton, on whose pedestal is inscribed "*Qui genus humanum ingenio superavit*," has of late years been joined by equally magnificent statues of Macaulay and Whewell, but beyond this there is little change noticeable in the ante-chapel. In the chapel proper, however, the centre of attraction is the baldacchino, of Norway oak, with its richly-carved pediment, flaming urns, and finely-sculptured wreaths of flowers. The baldacchino has been cleaned and partially gilded; the old altarpiece, by Benjamin West, representing St. Michael binding Satan, has been removed, and is to be replaced by a painting of the Ascension, with a smaller one below representing the Burial of our Lord. On the dexter side of the baldacchino is a figure of the Virgin, and on the sinister side one of John the Baptist. The roof, which is of timber, divided by rafters into square compartments, has been decorated by Messrs. Heaton, Butler, and Bayne. The first sixteen panels are illustrative of the 4th chapter of Revelation; then there is a band of angels with the Gloria; and the remainder illustrate the Benedicite, this part being divided into three distinct portions—the first centre being filled with the tribes of Israel, the second with the green things, and the third with angels. The walls are decorated according to a scheme having for its object the illustration, by figures and trees, of the principal Scriptural events. The figures are in medallions, and the trees occupy areas of 7ft. or 8ft. Thus, beginning at the west end of the south wall, there is Adam, and the apple-tree below, showing also the serpent and four streams; then Melchizedec, with the wheat and vine; Jacob and the palm-tree; a larger space than the rest, on which there is a representation of the Nativity; next David and the cedar of Lebanon; Josiah and the oleander tree; Ezra and the almond. On the north side there appear Noah with ark and olive-tree; Abraham and the oak of Mamre; Moses and the papyrus; Aaron and the acacia; Joshua and the pomegranate, fig, and vine; Elijah and the broom of the will derness; Daniel and the willow; and Malachi and frankincense. The windows have been completed, and contain no fewer than 120 figures (eight in each window), representing eminent personages in Christian history, from the Apostles down to the eighteenth century (finishing with Bentley). The tarsia work for the panels of the stalls is the gift of Mr. Beresford-Hope.

At *St. Catharine's College*, several houses, &c., having been taken down, the builders have for some time been at work constructing a new Master's lodge on the site thus obtained, between Silver-street and the main quadrangle. The present Master's Lodge is, it is said, to be utilised as Fellows' rooms. A little farther, the "house" which Queen Elizabeth apostrophised for its venerable and religious *ensemble* has been greatly altered and improved of late, and the work of progress is yet far from complete.

The old buildings between Magdalene College and the river, including one or two houses in Magdalene-street, have been rased to the ground, which has been levelled to the whole extent of the first quadrangle and the court behind it. At present it is believed that the space thus provided will be devoted to ornamental grounds, but ultimately a new library or some other structure may occupy some portion of the area.

In the town itself many and various new buildings are erecting, and some of the streets are being widened and improved as to their lines of frontage.

#### CHIPS.

A Wesleyan chapel, which has been erected at a cost of £3,000, has been opened at Eston, in Cleveland. The architect was Mr. Edward Taylor, of York, and the contractors Messrs. Paley and Bulmer, Eston.

At the anniversary of the Canynge Society in Bristol, on Tuesday, it was reported that nearly £40,000 had been expended in restoring the Church of St. Mary Redcliffe. The work is now nearly completed, but the Society is to be continued, so as to help in the work of restoring Bristol Cathedral and the parish-churches of the city.

A proposition was laid before the Metropolitan Asylums Board, at their meeting last Saturday, for the permanent reconstruction of the Hampstead Asylum, at a cost of £80,000, in order that it may be available in case of epidemic diseases breaking out. It was ultimately resolved that the proposition, together with details as to the interim use of the asylum, should be referred to a committee for consideration and report.



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ILLUSTRATIONS.  
NEW BRANCH BANK AT SEVENOAKS—LABOURERS' COTTAGES AT HARBONGATE—CORPUS CHRISTI CHURCH AND PRESBYTERY, COVENT GARDEN—CLYMPING CHURCH, SUSSEX—BELLEVILLE, NEAR DIEPPE.

## OUR LITHOGRAPHIC ILLUSTRATIONS.

## CLYMPING CHURCH.

THIS charming little church is situated about two miles from Littlehampton, and three from Arundel. It consists of a nave and aisle, north transept, a chancel, and a tower. The latter is all in Norman work, and originally acted as the south transept, into which led the fine old doorway which is at present filled in with masonry and soil. The style of the remainder of the church is Early English, and exceptionally pure. The nave arches and columns have never been surpassed in their delicacy and fitness. As will be seen by the view, the aisle is an addition, but one within a very few years of the body of the church, which is confirmed by the work in the nave arches. I understand there is a project on foot for its restoration, and that Sir Gilbert Scott has been consulted on the subject.—H. A. G.

## LABOURERS' COTTAGES, ESSEX.

We give this week plans and sketch of a pair of cottages, several of which have been built upon the estates of G. Alan Lowndes, Esq., in the county of Essex. The feature of the plan of each cottage is a good-sized dining-room, with a small scullery large enough for washing-up in, but not for living in. In addition to these apartments, there are on the ground-floor a porch, pantry, coalplace, and earth-closet; and, on the chamber-floor, three bedrooms, two of which have fireplaces. The cottages are brick-built, with tiled roofs. The dining-room has a boarded floor, the other rooms on ground-floor being gravel. The cost of these cottages has varied a little, according to the distance for carting sand, bricks, &c. The actual cost, including grates and fittings of every kind, and a well 30ft. deep, with pump to each pair, has been from £265 to £275 per pair. Mr. F. Chancellor, of 8, Finsbury-circus, and Chelmsford, is the architect.

## NEW LONDON AND COUNTY BANK, SEVENOAKS.

This building, which is approaching completion, occupies a prominent position in the town of Sevenoaks. It includes the offices of the London and County Bank, with residence for the manager. The ground-floor is principally occupied by the bank office, manager's office, and dining-rooms, and the public and private entrances. In the Bank are the strong-room, clerk's lavatories, w.c.'s, &c., and the kitchen and other domestic offices, the upper part of the house being devoted entirely to the manager's private apartments. The materials used are red brick, the ornamental details being executed in Watcombe terracotta. The roof is covered with green Eureka slates. The architect is Mr. F. Chancellor, of 8, Finsbury-circus; and the builders, Messrs. Punnett and Son, of Tunbridge.

## NEW CHURCH, MAIDEN-LANE, COVENT GARDEN.

We give this week a view of the church and presbytery in Maiden-lane, which was opened on the 21st inst. by the Archbishop of Westminster. The works have been carried out at a cost of £8,000, by Messrs. Sharpington and Cole, builders, of Westminster-bridge-road, from the designs of Mr. F. H. Pownall, of Montagu-square. Mr. Gressendell has acted as clerk of the works.

## BELLEVILLE, NEAR DIEPPE.

We gave a sketch and details, measured and drawn at Belleville, near Dieppe, by Mr. E. W. Godwin, F.S.A., to which, in all probability, he will refer at length in the continuation of his "Notes on a Tour in Normandy."

## THE PINES AND SPRUCE-FIRS OF THE UNITED STATES, CANADA, AND NOVA-SCOTIA.

OUR supply of building-wood so much depends at present on American pine and spruce-fir, especially in those ports and their neighbourhoods which are most convenient of access from America, that a brief notice of the principal varieties will not be unacceptable to consumers of timber.

Pitch-pine, which is so well known in this and other British markets, is found nearly all over the United States, except the maritime parts of the Atlantic States, and the fertile regions west of the Alleghany Mountains; but most abundantly where the soil is diversified but generally meagre. The most northerly points where it has been observed are the neighbourhood of Brunswick, in the district of Maine, and of Burlington, on Lake Champlain, in Vermont. In these places it generally grows in light, even, friable sandy soils, which it occupies almost exclusively, but here it does not exceed 12ft. or 15ft. in height. In Pennsylvania and Virginia it attains the height of 35ft. or 40ft., and 12in. or 15in. in diameter. In the lower parts of New Jersey, Pennsylvania and Maryland, it is frequently seen in the large swamps filled with the red cedar, which are constantly miry or covered with water; in such situations it is 70ft. or 80ft. high, and from 20in. to 28in. in diameter. The pitch-pine has a thick, blackish, deeply-furrowed bark. It is remarkable for the number of its branches, which occupy two-thirds of its trunk, and render the wood extremely knotty. The concentric circles are widely distant, and three-fourths of the larger stocks consist of sap. On mountains and gravelly lands the wood is compact, heavy, and surcharged with resin, whence is derived the name of pitch-pine. In swamps, on the contrary, it is light, soft, and composed almost wholly of sap: it is then called sap-pine. The vast consumption of yellow pine has caused a demand for this species, and the importations into this country have generally been satisfactory. On some parts of the Alleghanies, where this tree abounds, houses are built of it, and the wood, if it is not covered with paint, is recognised by its numerous knots. It is better than the yellow pine for floors that are frequently washed, as the resin with which it is impregnated renders it firmer and more durable. The pitch pine seems formerly to have abounded in Connecticut, Massachusetts, and New Hampshire; for since the beginning of the seventeenth century till 1776, they have furnished a certain quantity of tar. About the year 1705, upon a misunderstanding with Sweden, whence she had drawn her supplies, Great Britain encouraged this branch of industry in the northern part of America by a premium of £1 sterling for eight barrels of tar made from dead wood and of £2 for the same quantity extracted from green trees.

Loblolly pine, as it is called throughout the lower part of the Southern States, except about Richmond and Petersburg, in Virginia, is found in the lower part of the last-named state and in the districts of North Carolina, situated north-east of the river Cape Fear, wherever the soil is dry and sandy. On spots consisting of red clay mingled with gravel, it is supplanted by the yellow pine, and by different species of oak. In the same parts of Virginia, this species exclusively occupies lands that have been exhausted by cultivation, and, amid forests of oak, tracts of 100 or 200 acres are not unfrequently seen covered with thriving young pines. The trees exceed 80ft. in height, with a diameter of two or three feet. It has a still greater proportion of sap than that of the pond and pitch-pines, and is liable to rapid decay.

White pine, known by this name in Canada and the United States, from the perfect whiteness of its wood when freshly exposed, is diffused, though not uniformly, over a vast extent of country. The wood of this species is employed in greater quantities and far more diversified uses than that of any other American pine; yet it is

not without essential defects; it has little strength, gives a feeble hold to nails, and sometimes swells by the humidity of the atmosphere. These properties are, however, compensated by others, which give it a decided superiority, especially its freedom from knots. It is also light, easy to work, and durable, and gives hewn timber and planks of large dimensions. The finest timber of this species is brought from Maine.

Yellow pine is widely diffused in North America. The concentric circles of the wood are six times as numerous in a given space as those of the pitch or loblolly pines. In trunks of 15 or 18in. in diameter, there are only 2in. or 2½in. of sap, and still less in such as exceed this size. The heart is fine-grained and moderately resinous, which renders it more compact without great weight. Long experience has proved its excellence and durability, but for whatever purpose it is used, it should be completely freed from the sap, which speedily decays.

The Cembra pine is found both in Europe and America, but not in sufficient quantities in the latter country to demand further notice. Sabine's, or prickly coned pine, was discovered on the western flanks of the Cordilleras of California, by the late Mr. Douglas. It also occurs in some part of the range of the Blue Mountains of Oregon. The wood is white, soft, coarse-grained, and not very durable. Copious supplies of resin can, however, be obtained from the tree.

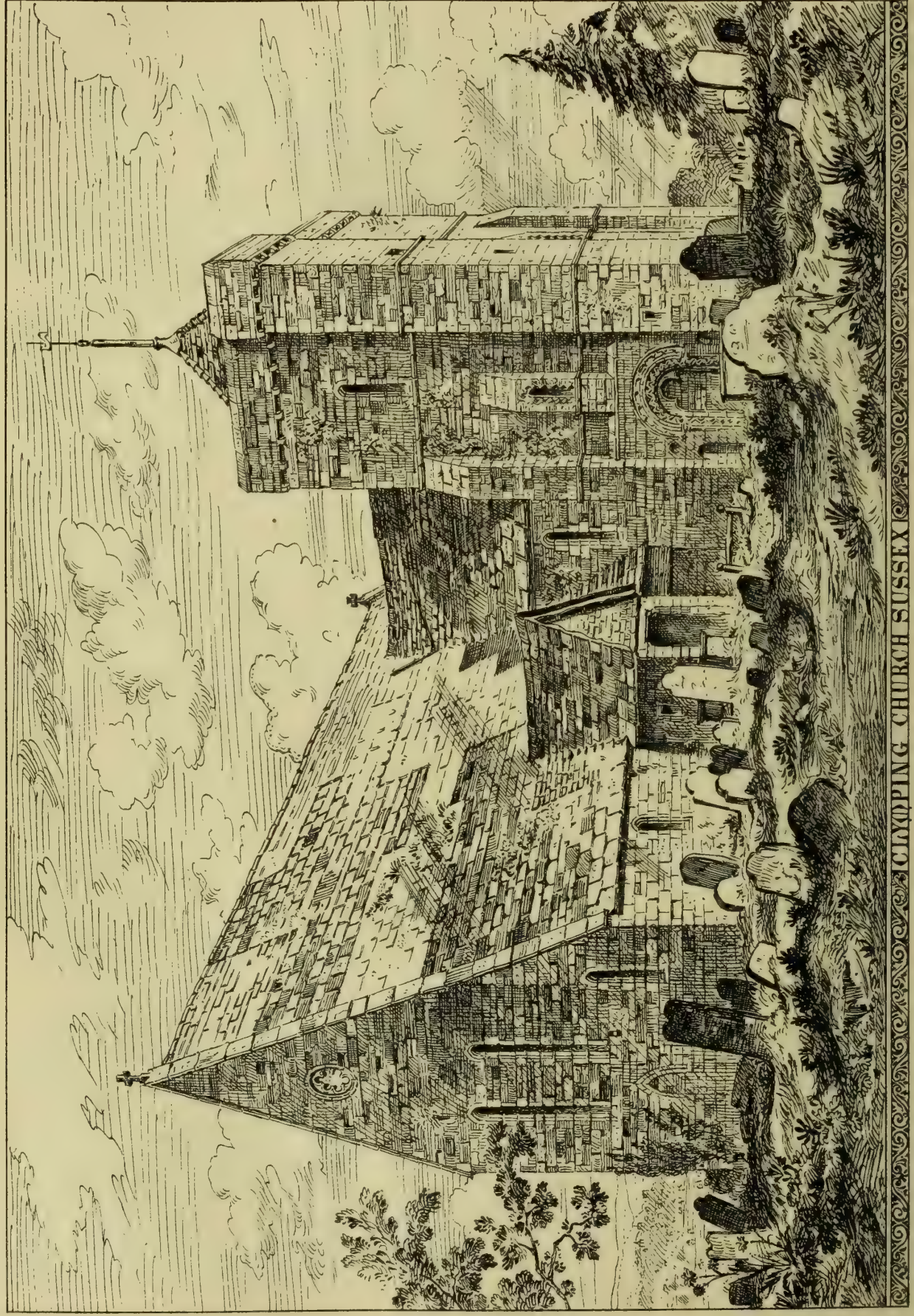
Coulter's pine, found on the mountains of Santa Lucia, rises to the height of 80 or 100ft., and has a diameter of 3 or 4ft. The gigantic pine covers large districts about 100 miles from the borders of the Pacific, in latitude 43° north, and continues to the south as far as 40°. The trees do not form dense forests, in the manner of the other pines of the north-west coast, but are scattered simply over the plains in the manner of the Californian species. This stately species attains to a height of 150ft. to 200ft., and varies in circumference from 20ft. to 60ft. The trunk presents an erect shaft devoid of branches, of from 100ft. to 170ft. elevation, covered with a very smooth, light-brown bark. Its timber, like that of the white pine, is white, soft, and light, abounding in turpentine reservoirs, and has a specific gravity of 0.463. The annual layers are very narrow, presenting fifty-six in the space of 4½in. on the external side.

Table Mountain Pine.—Large forests of this tree were growing at no distant date along the Blue Mountains, on the frontiers of Virginia, but no reliable data exists as to the quality of the wood. There are other varieties of pine, but space will not permit a notice of all. The long-leaved pine is not only known by this name, but as yellow pine, pitch pine, and broom pine, southern pine, red pine, &c. It is very free from sap, is compact, durable, fine-grained, and susceptible of a high polish. In certain soils its wood contracts a reddish hue, and it is for that reason known in the dockyards of the Northern States as red pine. This is what we call Georgia pitch-pine, the value of which is well known; but there is some confusion, as to names, which is apt to deceive the best-informed investigator at first glance. In Canada, that which we call red pine passes by that name, but in the Northern parts of the United States it is styled Norway pine, although wholly differing from that tree, which is a species of spruce. It does not, like the black spruce, the hemlock spruce, and the white pine, constitute a large proportion of the extensive forests which cover these regions, but occupies small tracts of a few hundred acres alone, or mingled only with the white pine. The concentric circles are crowded in this tree, and the wood, when wrought, exhibits a fine compact grain. It is highly esteemed for strength and durability, and is capable of furnishing planks 40ft. long, devoid of knots. Its price has, however, caused a falling off in its consumption of late years, Swedish fir being used as a substitute. On a future occasion the different varieties of spruce firs in the United States and British North American possessions will be dealt with.









HERBERT A. GRIBBLE .DEL.

Photo Lithographed & Printed by James Alberman 51, Gray's Inn Road W.C.



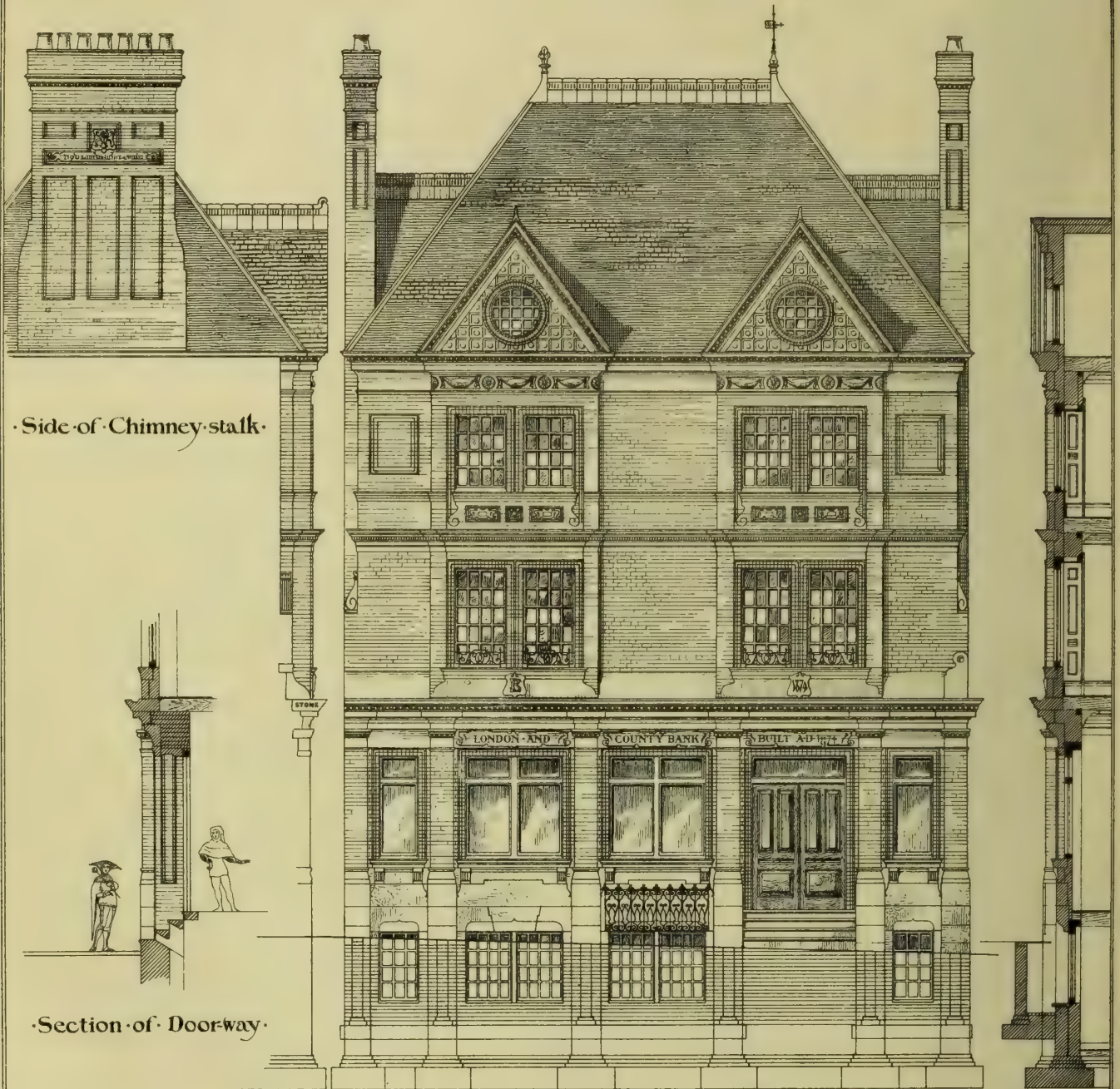




NEW : BRANCH : BANK : SEVENOAKS : KENT : for the

LONDON : AND : COUNTY : BANKING : COMPANY :

FRED : CHANCELLOR : ARCHT.



Side of Chimney stalk.

Section of Doorway.

Front Elevation.

Section.

Plan of First floor Windows.

Plan of Ground floor ditto.

Plan of Basement Windows.

Scale of feet.

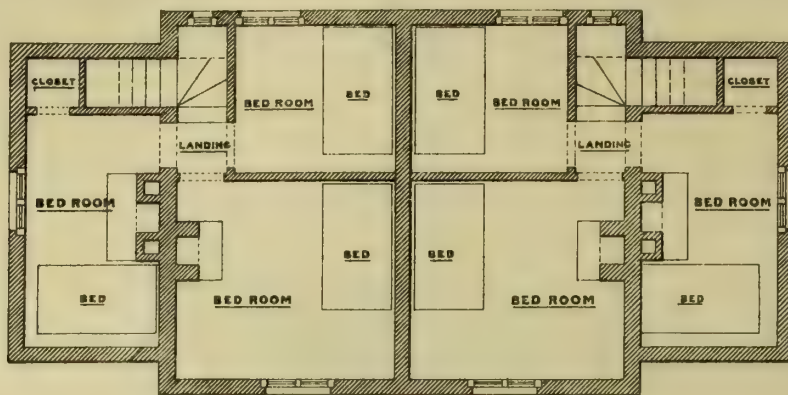




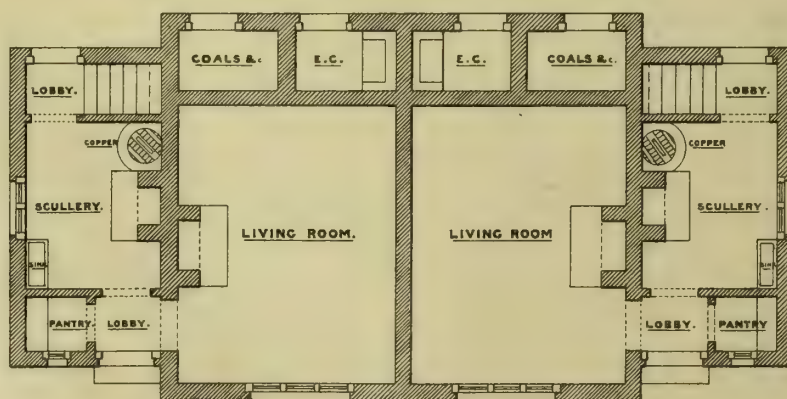




LABOURERS' COTTAGES AT HARONGATE AND AT HATFIELD, BROAD OAK, ESSEX, FOR

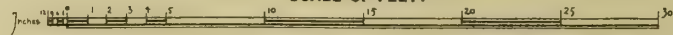


CHAMBER PLAN



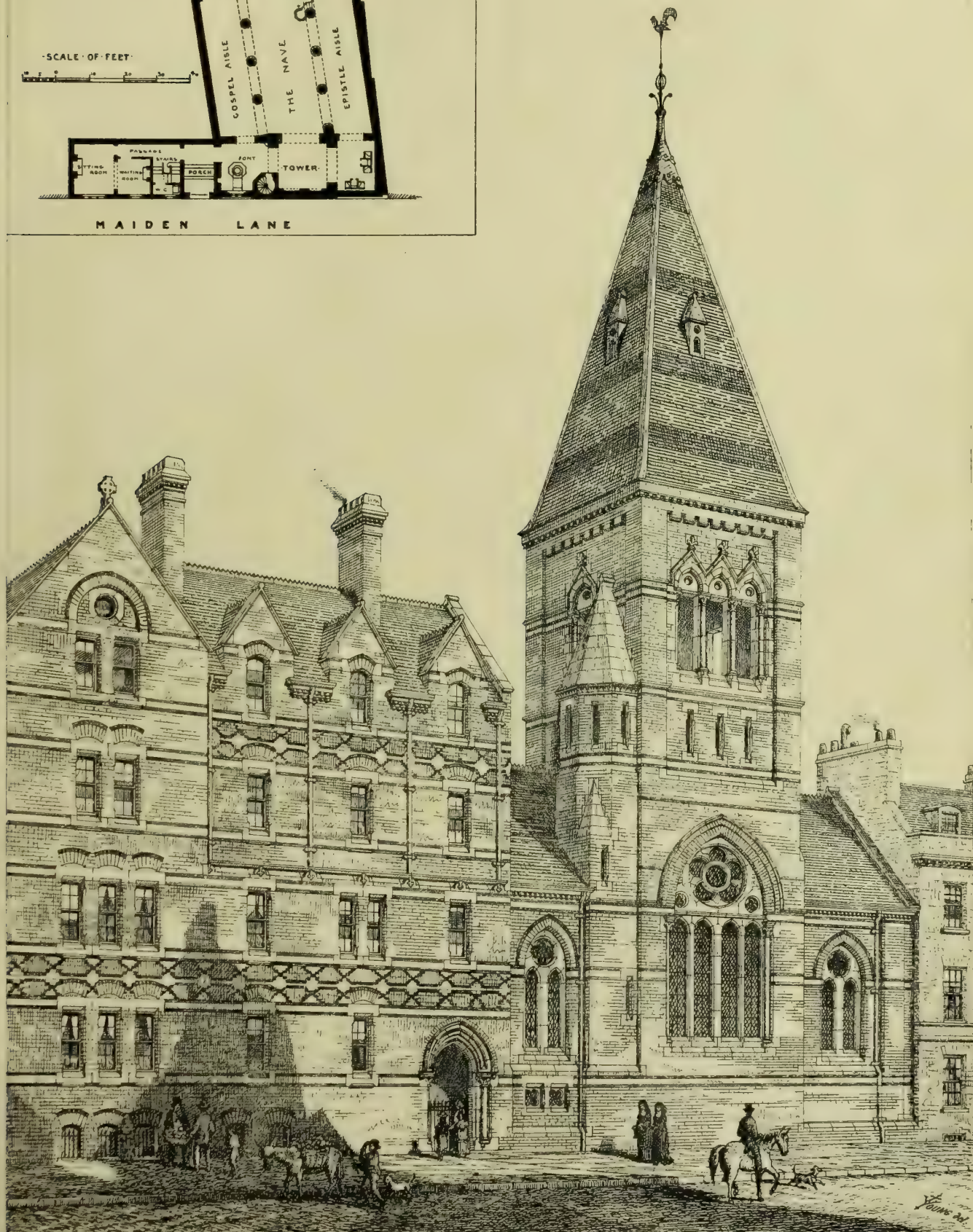
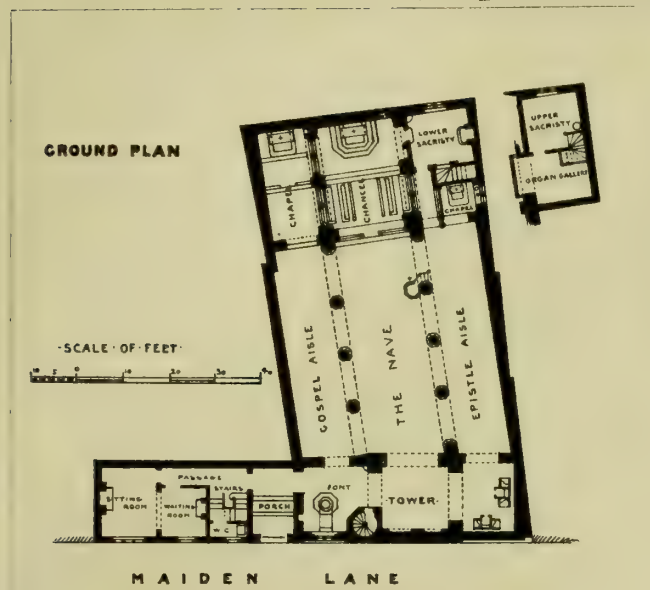
GROUND PLAN

SCALE OF FEET



E. A. LOWNDES, ESQRE. FRED. CHANCELLOR, ARCHT





Photolithographs & Prints by James Akerman, 51, Gray's Inn Road, W.C.

I.M.I.C.

Fred. Hyde Pownall, Architect.

Corpus Christi Church and Presbytery,  
Maiden Lane, Covent Garden.







NEW : BRANCH : BANK :  
FOR : THE :

SEVENOAKS :  
LONDON : & : COUNTY :  
BANKING : COMPANY :

KENT :

FRED CHANCELLOR  
ARCHITECT

Section A

DETAILS  
of  
FRONT :

B

Section B

Section thro'  
Gables

Section C

Side view  
of Bay

Section D

Section E

Elevation

E

Ground line

SCALE OF FEET

10' 6"

13' 0"

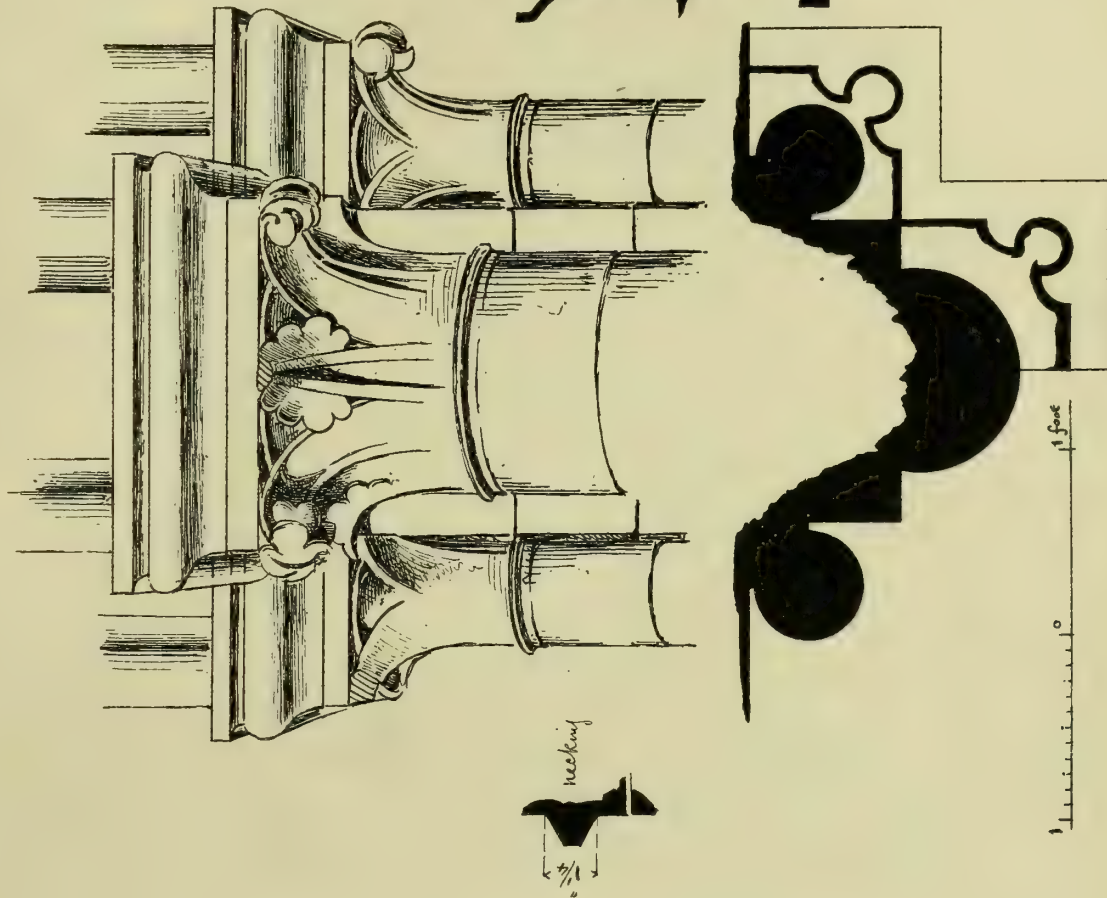
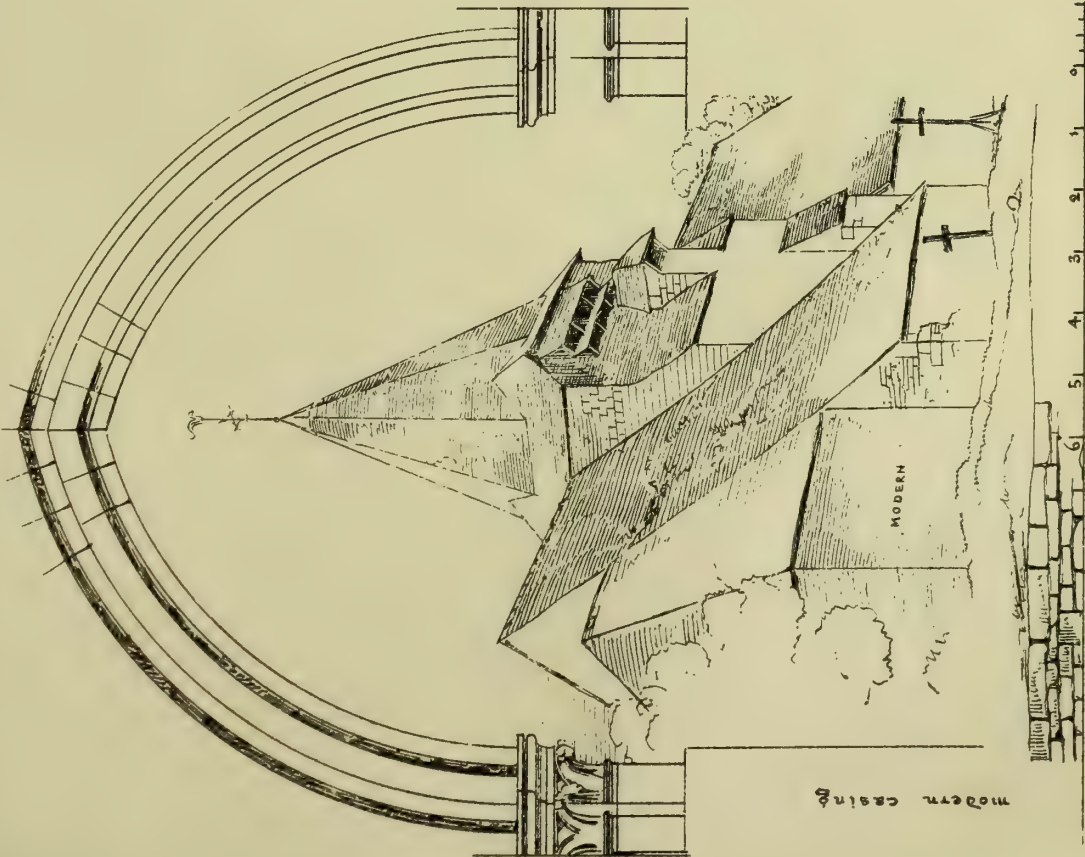






Belle Ville near Dieppe

Designed & drawn by E. B. Gordon









## ENGLISH ARCHITECTURE.

A VIGOROUSLY written article in the present number of the *Quarterly Review*, taking as its text Mr. Fergusson's second edition of the "History of the Modern Styles of Architecture," so singularly and emphatically exposes the delusion of the modern system of architecture and architects, and the "royal, reverend, and noble victims" of that system, and so aptly confirms all we have said from time to time upon the "rotteness" of a method of academic instruction which makes an architect merely a kind of conventionality, in which mere draughtmanship and a kind of instrumental art acquaintance only is needed, that we cannot allow the opportunity to be lost. Mr. Fergusson, in his well-known and able handbook, has shown in what the true Styles—those of Ancient Architecture—consist, and in what the Imitative or Copying styles consist, which are now followed, and have been so for three hundred years. He shows that our best modern works are no better than any of those reproductions of the Revival, as the Walhalla or the Madeleine, which architects in the present day are wont to despise; while our modern architect is inferior often in points of genius, ability, and nervous energy, to a mason or a leading joiner. The beautiful buildings scattered over the Europe of the Middle Ages, which we copy with such zest, were frequently the works of village masons, unlettered, and without any knowledge of draughtmanship, but men who followed their own constructive instincts and the "dictates of common-sense." If it be asked, "How is it we do not find such men now of such ability or imaginative power?" it is easily answered. Give him his old position as a working and thinking mind, without stint, without the controlling and cramping influence of working under another mind; make him feel, in a word, he is independent in action and scope; give him only a free exercise of that profession or talent he possesses, and his light will no longer shine under a bushel; he will probably startle his generation by the power and grasp of his conceptions. It is observed, and with truth, that if a "mill-hand or machinist or a manufacturing engineer," could but regain his natural position, "his mental power becomes magnificent. Of the seven hundred patents for our hosiery and lace machines, every inventor except two has been recorded as a working handicraftsman." Here is a momentous proof. The great idea that cannot be too forcibly dwelt upon is that Art is not a monopoly of one set of men, or of one class of patrons—it is not a prerogative of a certain recognised profession or class of men who follow it as a livelihood. It is this vague notion that has taken hold of all classes or professions of art. But let us briefly recapitulate some of the arguments of the writer. Mr. Fergusson says, speaking of this system of architecture, it "degrades architecture from its high position as a quasi-natural production to that of a mere imitative art. In this form it may be quite competent to gratify our tastes and feelings, but can never appeal to our higher intellectual faculties." But besides this, it has lost its ethnographic value and signification—"so completely is this the case that few are aware that such a science exists as the Ethnography of Art, and that the same shifting fashions have not always prevailed."

To cathedral restorers Mr. Fergusson applies a timely rebuke for the wastefulness of applying art, energy, and money in producing imitations in "defiance of every principle of Gothic art," and in making our churches, abbeys, and cathedrals, "in a second sense, memorials of the past." "All our grand old buildings are now clothed in falsehood, and all our new buildings aim only at deceiving." "If this is to continue," says the writer, "architecture in England is not worth writing about." The great point insisted on by Mr. Fergusson

and the writer of his review is the fact of a *master-workman* being the presiding power in all true architecture, and that he alone led art to the perfection it reached. In every true period the workman was the *master*; history confirms the fact, though it may be rather unpalatable to some of our fashionable *architects* of *custom* and patronage to be told so. That his social status was not so high, we need not say. Plato shows us what the architect of Greek excellence was. A common builder (*τεκτονα*) could be bought for five or six minæ at most; but a master-workman (*ἀρχιτεκτονα*), equivalent to our word "architect," "not even for ten thousand drachmæ, for there are few of them among the Greeks." By this we find the master-workman was in reality a slave, though he was worth above "four hundred pounds," twenty times of greater worth than a labourer, and could scarcely be bought for money. This definition is important; it shows us the Greek architect was a workman in one sense, but also a master-workman advanced by his own natural ability and power to that position. It gives us a very different conception to that of the modern architect, who is an academically-trained follower of some school—in fact, not very different to a buyer and seller in some trade. This master-workman was the ruler of the workmen, *always upon the works*, assigning to each workman under him his "appropriate task," and, therefore, necessarily a workman himself. We quote the reviewer's remarks here:—"It is further remarkable that we seldom read of a *Greek* architect who built more than one temple, and never do we find him engaged on more than one building at a time. We never hear of him as a draughtsman, but so frequently are architects called also carvers that many must have been proficient in the plastic art. Theodorus, architect at Samos, was a modeller and carver. Callimachus, the inventor of the Corinthian capital, was, of course, a carver; and, besides, he was a goldsmith, an embosser and engraver, a maker of lamps, and, in fact, a very accomplished workman." Chotas and Phidias were carvers; the former an assistant to Phidias, and Phidias was not the sub-contractor for the carvers' work, but as the "noblest of the workmen, he was made by Pericles the chief superintendent of the works, the architects or master workmen being under him. Plutarch tells us that Phidias directed all, and was the overseer of all for Pericles. And yet the buildings had great architects and artists of the works. For the Parthenon was the work of Callicrates and Ictinus; and almost all things were in his hands; and, as we have said, he superintended all the artists." The importance of the above quotation is at once seen. The system it inculcates is one widely different from the system under which modern architects work, draw designs simply, and periodically visit their works, adopt an idea of their own, and make all the workmen so many instruments—we will not say slaves—even though their own acquaintance with the different materials may be very limited, and not at all practical, as, indeed, it seldom can be. There are no records of the drawings of these great masons and craftsmen. Phidias was not a draughtsman, and yet he managed to express in marble the sublimest proportions and forms. He was brought up in the workshop among other workmen, and, thanks to Greek civilisation, his excellence was prized, and his natural powers deified and immortalised. The most humble workmen, on the authority of Winckelmann, were distinguished by the surname "godlike," and their memories were made as immortal as their gods. Greek art, then, was the product of the workman; no professionalism or draughtsmanship was concerned about it, and the "artists lived at their work."

Vitruvius is equally strong in his treatise, although he has been taken by the apologists for imitatorial art and by the advocates of professionalism as the authority for modern

education and practice. This author says plainly in his treatise that "architecture is a science arising out of many other sciences, and adorned with much and varied learning." The rules laid down by Vitruvius, as the reviewer justly says, "were the law of the profession that was added because of transgression. The workmen's inspiration had been lost, and the schoolmaster's rules were substituted."

So far, indeed, Vitruvius is not rightly understood when he is regarded as the representative of the modern profession. His writings show clearly the architect was a very different kind of being to what we have sometimes imagined. He was either expert as a mechanic or as a mason; he personally overruled the work, and was often a contractor for it. According to Vitruvius, then, we find evidence of the master workman, and Mediæval art bears undoubted and incontestable proof of the system.

The reviewer says an appeal to low instincts and ignorant prejudices has made us greedy of luxuries. "And yet, after centuries of neglect and of admitted failure, we still continue to despise the workman, and vainly trust in the imposture that would fain imitate his works, and thus pretend to take his place. It is the workman only that can effectually perceive and feelingly originate the more subtle elements of good architectural design." Dilettanti and connoisseurs and "men of taste" have, we are inclined to think, made art too much of a "fine profession," rather than the outcome of the various talents and energies of different workmen or individuals. We think, with the reviewer, the term "fine art" has rather tended to "scare the uninitiated and exclude the vulgar." Art "did mean true imaginative work, but now it means a trade." Art "should be known as work, not as the mere prefigurement of work." The writer says, instead of talking of sculptors, professors, architects, and artists, we should talk of "carvers, master-masons, painters, braziers, carpenters, and smiths." Instead of studios and offices, we should go back to the workshop, and we should learn that the imagination of a man is not to be for another's glorification, but for his own pleasure and profit. When the "rights" of the workman are acknowledged, then architecture may begin to hope, but not till then, or till the "fashionable vanities" of "fine art" have no claim to be considered.

We will not enlarge on this important topic further; it is quite certain much has to be done to place art in the position it should occupy as a living power, not a dead transcript—a mere fashion for dilettanti to rave about. To do this the workman must be taken into our confidence, his work must be appreciated as a natural product of his brains, not made to be the material of others, in which he cannot possibly possess any interest; it is true our "working men have no sympathy with those who call themselves their 'chiefs.'" Directly we give the workman a power and interest in his work, we raise him in the social scale; we give him a more refined taste, and we, at the same time, ennoble the art in which he exercises that power and interest. Dilettante art and patronage can never achieve one thousandth part of this natural education; all our educational efforts are wasted unless accompanied by this self-evolution of ability. "Our present working classes" are "profoundly vulgar"; wages and the education that they may receive will be powerless to help them until this moral work—this great principle of self-evolution of faculty—is understood and exercised.

We might allude to several instances where this power of the workman has borne good results. The "Portuallis Club," Regent-street, Westminster, as an instance where the labour and design have both emanated from the working men themselves: they were their own architects in the truest and only sense and we are told the front "is much more



satisfactory and respectable than the Charing Cross Hotel or the Royal Academy façade." But we have no space to name other instances. The Athenian, the Roman, and the Mediæval Arts boasted in the wealth of the working-man's power; and though we have a hundred-fold more opportunities, and are better off, we are certainly not better. Education has done much, but it must first induce the power, or its work is useless; it must help the faculty to enable the workman to work as a rational and responsible being, not as the tool of another. Till this is reached, art must still remain a slavish product, and its workers slaves.

### ARCHITECTURAL ANTIQUITIES OF ROME.

IT is now just half a century ago since the late George Ledwell Taylor and Edward Cressy published their well-known and authoritative work on the "Antiquities of Rome." At that time the work was one of the most important contributions to the literature of architecture. It imparted an impulse to Roman architecture, as its celebrated predecessor, published by Stuart and Revett, created a revival of the architecture of Greece. Both works may be said to have been the textbooks of the profession of the day, and to have done as much to revive the Classic taste of the time as the works of Pugin, Rickman, and Britton did for the Gothic revival. Architectural students who had well-thumbed their Vitruvius, and could refer to those authorities (Stuart and Taylor), had, in truth, mastered their profession, and could lay claim to be tolerably well-up in their calling. Since that generation the whirligig of fashion has given us Italian, Mediæval, and Continental styles, and is now again bringing us—if we are to judge by recent events—back to Classic types. We feel sure, at least, that the new edition of this standard work, recently completed, and published under the care of the late Mr. Taylor's son, the Rev. Alexander Taylor, M.A., will be welcomed, especially since its author, whose useful life terminated only a few months since, had recently visited Rome for the purpose of revising the work for the press and furnishing those supplemental accessions which the lapse of half a century has brought about in our knowledge of Roman archæology and topography. It was not long ago we gave a *résumé* of a paper by the author, read at the Institute of Architects, in which he detailed some interesting discoveries; and we also noticed a portion of this great work on Roman Architecture.

The most valuable architectural remains of Rome are comprised between the Capitoline Hill and the Colosseum, and in Mr. Taylor's work we have, on a scale of 1 in. to 100 ft., a detail plan, showing recent discoveries, the Roman Forum, and the other Fora, lying northwards comprising the restored plans of the Basilica Ulpia, Fora of Trajan, Augustus, of Nerva, Temple of Peace, Basilica of Constantine, Temple of Venus, and other fragments of temples and arches. Various streets now intersect this classical area, though all important dimensions and distances are marked to assist the student to determine the bearings of important buildings. Of the Arch of Constantine a beautiful etching, by E. J. Roberts, from the author's drawing, together with ten other plates of measured details and bas-reliefs, give an excellent and minute description, and the positions from which the sketches were taken are marked on the plan—a valuable point in such delineations. The original marble paving under the archway is now seen in slabs, of about 5 ft. by 14 ft. The span of the middle arch is 21 ft. 8 in., its height 37 ft. 8 in. to crown. The spans of the side arches vary, one being 11 ft. 1 in., the other 11 ft. 5 in. The whole width of this splendid archway is figured 83 ft. 2 in., and its depth, exclusive of

the detached columns, 23 ft. 9 in. It is the best preserved of Rome's triumphal arches, and is the most magnificent of any, being erected by the Senate in honour of the Emperor Constantine's victory over the tyrant Maxentius.

It may interest those who do not know this splendid example to say it is (with the exception of the eight-fluted Corinthian columns, which are of yellow antique marble) built of white marble, without cement, and cramped with bronze. The lateral arches do not communicate with the central. The western pier contains the stairs leading to a vaulted chamber in the attic, which extends its whole length with arches and piers over the piers below. Externally, the attic has its centre filled with the inscription, and the double panels on either side are occupied with bas-reliefs, representative of the exploits of Trajan, his triumphal entry into Rome, the Appian Way, lengthened by him to Brundisium, the same Emperor feeding the hungry, &c. There are in all twenty bas-reliefs, eight circular ones filling the spaces over the side arches. The spandrels of the principal arch are occupied by the Fames, those of the side ones having the river gods; these are of Constantine's age. The statues of Dacian prisoners which surmount the pedestals of the attic over the columns are of Phrygian marble, and are, with the other bas-reliefs and enrichments, taken from the arch of Trajan, which was erected by Apollodorus in the palmy days of Art, but afterwards demolished to decorate the arch of Constantine. The proportions of this famous arch are perfect. The side openings approach a double square, and are one-half the width of the centre opening, whose proportions and size nearly agree with the arch of Severus. The main cornice was probably brought from some other edifice, as portions of stone indicating a cutting-away of the upper member over the corona are left. The order and entablature are finely executed and enriched.

The Pantheon is another building beautifully and amply illustrated in Mr. Taylor's work. Fifteen finely-etched engravings represent it. Its situation is at present destructive, as it is encumbered by modern houses, and the base of its portico is nearly buried in the accumulated soil of the Campus Martius. Antiquaries appear to differ much as to what part of this noble structure is attributable to Agrippa, whose name is inscribed upon the frieze of its portico. Michael Angelo gives three epochs—one for the portico, another for the interior order, and a later for the attic. Mr. Taylor follows the opinion of Signor Hirt. Vitruvius does not mention the Pantheon, though he speaks of other buildings erected during the first years of Augustus. Pliny corroborates the opinion that Agrippa was its founder, and that it was dedicated to Jupiter the Avenger. The word "Pantheon" is generally supposed to be derived from its dedication to all the gods; but Dion attributes it to the vaulted form of the roof. The general plan and structure of this building is so well known that we shall here merely allude to one or two features. We think few buildings erected by the ancients have so strong a claim on modern architecture and modern wants as this grand circular vault. The very connection of a circular form or cella with a rectangular portico is itself a bold idea, and we have scarcely any modern counterpart save the old Colosseum near Regent's Park, whose fate is in the hands of the building speculator, and which achieved for its author, Mr. Decimus Burton, a reputation in his day. This example may at least give us some idea of the grandeur of its ancient archtype externally. The portico is one of the finest of Roman octastyles, arranged on the pseudo-dipteral plan, each column being of a single block of granite 5 ft. in diameter, and 46 ft. 5 in. in height. Seven steps approached the platform, though only three are to be seen now. The capitals and bases of the Corinthian order are of white marble, and the capitals are

justly reckoned the most unique of Classical examples. There is a remarkable lightness and elegance about the outline and details of the columns and their spacing (systyle) that gives an air of extreme openness to the portico. Forsyth declares it faultless, and that it is "the most sublime result ever produced by so little architecture." The great height of its pediment has been commented on by critics; the tympanum is very large, and unrelieved at present, but when we regard the effect of a bronze bas-relief formerly occupying that space, the appearance must have been very different. The cramp holes still remain to attest the existence of a bronze bas-relief. A square mass of work behind the portico detracts from the connection of the portico with the cell; this was an alteration made by Bernini, who cut away the central part of the cornice seen above the portico in order to form his tower. Three naves divide the portico, the central one having three, and the side ones two, intercolumniations; these naves were covered with bronze, the centre one vaulted and the lateral ones flat, it is supposed. The beams on which the lacunariæ rested were taken to the Vatican under the Pontificate of Urban VIII., and form the four columns of St. Peter's Confessional. The walls of this great temple, 23 ft. in thickness, were built of *opus incertum*, with layers of tiles every 3 ft., and the dome was of the same material. The walls were covered with stucco, and had no doubt pilasters as shown by Palladio. The rough tile arches now seen in the work which discharged the weights over the openings are, with the cornices, now the only relief of this great cylinder of masonry. Without touching upon the salient architectural features so well known to most of our readers, we may allude to a few points of interest. Since Agrippa's time the interior has undergone many vicissitudes. Columns of marble, statues, and ornaments of bronze and silver, adorned it; and it is supposed that the present arrangement is in many respects different. Its walls were richly incrustated with marbles, though Guncirolo and other writers assert that plates of silver decorated the walls previous to the year 130. The Emperor Adrian, Severus, and Caracalla variously modified the interior, and it is a question indeed how far the columns and details as we now see them have been altered or restored during the lapse of so many centuries. The internal diameter is one hundred and forty-three feet, according to Taylor, and the clear height the same. The dome occupies exactly one-half the whole height, and rests on a recessed and panelled attic, executed in stucco, under Pope Benedict XIV., when the marble incrustations and pilasters were removed. The entablature of white marble, with its porphyry frieze, is carried by fourteen fluted columns of yellow antique and pavonazetto marble, the capitals and bases being of white marble. Nothing can be grander and more strictly architectural in character than the circular and square recesses or coves which decorate this magnificent interior. Combined with these, the intervening panels and niches of exquisite proportions and details display a splendid association of form, light and shadow, and all those accessory powers of architecture which aptly make this structure the "Pride of Rome."

Clarlborough Church, near Retford, was reopened after restoration on the 8th instant.

At the meeting of the Calstock School Board, on the 7th inst., it was decided to accept the plans of Messrs. Dwellley and Son, of Plymouth, for the erection of a new school and master's house.

Among the recently patented American novelties is a method of mending cracked church-bells, so as perfectly to restore their tone. It is said to be done by introducing a furnace within the bell, to warm up and fuse the edges of the crack, at the same time pouring in new metal enough to fill out the crack, the sides of the bell being covered with plates to prevent escape of molten metal.



## THE CHURCH OF ST. FRANCIS AT ASSISI.

(From the *Saturday Review*.)

SOME anxiety has not unnaturally been felt for the fate of the art treasures in the Franciscan convent and triple church at Assisi. The lands, amounting, it is said, to 42 estates, have been confiscated, and the monks dispersed; but what seems far worse, in the eyes of archaeologists and artists, is that restorers armed with the authority of the Government are hard at work in pulling away altars, knocking down walls, and renovating frescoes. The priests, as a matter of course, have been up in arms, and painters and many others whose cherished associations have been set at nought are still clamorous. But the first panic is now a little past, and a brief statement of facts which we have learnt on the spot may tend further to mitigate alarm.

On the dissolution of the Monastery of St. Francis, provision was made for the due performance of the services in the church, and a few of the monks are retained and subsidised for that purpose. As a matter of general State policy, they are not allowed to retain the picturesque garb of the order, but, dressed in black, they assume the office and the aspect of ordinary priests. We have recently witnessed in the Lower Church a function in honour of the Nativity of the Madonna, which, as to the music and the scenic display, was creditable to the clerical staff as now constituted. Moreover, the Government, in laudable zeal for the preservation of historic works, has taken the whole structure as a national monument under its protection, and a small annual grant is made for incidental expenses.

The reader may remember that the Church of St. Francis at Assisi consists in fact of three churches placed over each other. The lowest is little more than a chapel or a vault, and its only interest lies in the tomb of the Saint. This church has not been touched in the recent renovations. Then follows the Middle Church, a massive, shadowy, and almost sepulchral structure of the thirteenth century; the vaulted roof is of round arches; the side chapels, later additions, are pointed in the vaults and in the windows; the walls are covered with frescoes by the precursors of Cimabue, by Cimabue himself, by Giotto, and others. The Upper Church, also of the thirteenth century, displays the Gothic style in its early simplicity and breadth, and while the Lower Church is sombre and sepulchral, the Upper rises with joy as a creature of the light into the sky. Both churches were alike covered with frescoes, works which have cruelly suffered, and are in parts irretrievably lost. The two churches, when they had received in the fourteenth century the finishing touches of the chief masters of Florence and Siena, must have been the most lovely and mature manifestations of pictorial art applied to mural decoration then extant. But in the course of time not only did decay come, but, what was still worse, structures and paintings belonging to later and debased periods were ruthlessly thrust into the midst of the early and good work. The object of the changes now in progress may be said in general to be to reinstate, as far as practicable, the Lower and the Upper Churches in their original integrity.

This bold, and as some would say, rash enterprise has fortunately fallen into safe hands. Signor Cavalcaselle, the fellow-labourer with Mr. Crowe in the "New History of Painting in Italy," was to be seen daily during our stay in Assisi mounting scaffolding raised in front of frescoes, or descending to excavations made in search of some ancient but disguised structure. The responsibility of the work is shared by Professor Botti, of Venice, and others. And so much interest is excited that a little company of architects, painters, and amateurs has, during the past months, been gathered in Assisi. The Slade Professor of Oxford has been making studies from the frescoes; a German artist in the service of the Arundel Society has done more—he improves on what he sees; his copies, with one exception, which is said to be in facsimile, are of the nature of restorations; they do not represent the pictures as they now are, but as they might possibly have been. In addition to these labourers, there are architects busy in the taking of measurements, and archaeologists studios of masonry and observant of other indications of dates and styles. The operations in progress favour these investigations; they may be likened to railway cuttings which disclose hidden strata, or to dissections which lay bare an underlying anatomy. This is the very

time for some one to work out a careful monograph of the whole structure and its chequered history. Unfortunately, but few written records have been preserved; the monks of St. Francis appear to be as illiterate as they are inartistic.

The restorations were found one morning to have made a sudden and startling jump. During the night, by the aid of twenty or more men, the obnoxious modern altars were swept away, much to the consternation of the priests who came as usual to say mass. By this bold stroke of business light was let in at darkened windows; frescoes by the dozen, especially a Madonna, Child, and Saints, by Cimabue, were made to look out once more from walls long masked; while, in place of roccoco carpentry and gimcrack ornaments, stood the simple stone altars before which the immediate followers of St. Francis had worshipped. But the clearances did not stop here. From the choir of the Lower Church was taken a wooden singing-gallery whereby more frescoes were brought to light, and in like manner from the Upper Church stalls and seats in tarsia work, by no means bad in point of art, were swept away from the apse and the adjoining transepts. This wholesale measure we are inclined to think may have exceeded the bounds of discretion; the walls now present a bare and unfurnished aspect, and the pictures revealed, being mere wrecks, offer a poor compensation. Still it cannot be questioned that the east end of the Upper Church is thus brought back to its first estate, and moreover by the removal of these incumbrances it has become practicable to restore the high altar from the nave to its original site in the transept. It is difficult to realise, except on the spot, the collective result of these changes, but in general they may be said to attain the following ends—the clearance of a thousand and one trumpery appurtenances which offended common-sense and pure taste, the reduction of altar ornamentation to the comparative simplicity of the thirteenth and fourteenth centuries, and the consequent restoration of the whole fabric to its first estate. There cannot be a doubt that much has been gained for archaeology, and scarcely less for art.

While we write, certain tentative operations are in progress. A pickaxe and a spade are brought to clear away earth from the columns of the portal of the Upper Church, in order to ascertain whether the original approach was on the level of the pleasant grass-grown piazza, or by means of ascending steps from below. A few hours sufficed to prove that no remnants of steps exist. Another and more important investigation is directed to the reconciliation of hitherto unexplained anomalies arising from the scattered and almost purposeless distribution in the nave, chapels, and transept of the Lower and Upper Churches of marble slabs inlaid with mosaic. The conjecture is, not only that these ornate marbles may be made to fit together, but further that the collective structure constituted a choir, with ambones and screen similar to that typical form found in San Clemente, at Rome. It is almost too much to expect that the measurements and excavations now in progress will fit so precisely as to establish this ingenious conjecture. But, at all events, such thorough and painstaking search shows that the present generation of Italian architects and archaeologists, unlike their presumptuous predecessors, do not seek to destroy but are solicitous to reinstate. In this respect we observe in Italy a great change for the better.

The greatest difficulty has been to know what to do with the frescoes. They present different stages of decay, amounting in many places to absolute destruction; some have crumbled wholly from the walls, others are so far obliterated that the subjects can hardly be deciphered, while scarcely a single composition remains without the loss of a head, a hand, or an entire figure. Under the circumstances, what course is the wisest? Several alternatives presented themselves. Some persons would be found to urge that the works were too precious to be touched at all; but to this position a sufficient answer is that, if not dealt with somehow, they must perish irretrievably; the misfortune, in fact, is that they were not taken in hand a century or more ago. Other experts would insist on the adoption of that system of restoration, or rather of partial or entire repainting, which, though worse than the worst decay, has been for long the universal panacea in Italy. To mention a tenth or a hundredth part of the works thus ruined would far exceed our limits. Some of the frescoes in the Upper Church have been thus killed by kindness. Again, other counsellors might presume to advise even

the substitution of modern pictures in the place of the frescoes gone beyond power of recall; that in past centuries such a course was ventured on is evident in certain chapels of the Lower Church, where comparatively late frescoes now cover walls previously occupied by early paintings. We cannot but think that these various plans have been wisely set aside in favour of a measure which, stopping short of restoration or renovation, seeks simply to preserve whatever still remains.

The plan and process adopted and now in course of being carried to completion we will endeavour briefly to explain. We found on mounting the scaffolding which, in the Upper Church, reaches to the pictures which we hope may still be accredited to Cimabue, that workmen with chisels, hammers, trowels, and mortar were steadily operating under the immediate supervision of Signor Cavalcaselle and Professor Botti. Where a large piece of wall had fallen into rottenness, and was denuded of its picture, it was simply cut out and replaced by sound cement. Again, where only a small part of the intonaco was in decay, a chisel removed the crumbling mortar, and a trowel replaced the void by firm material which bound the surroundings together as by a wedge or a plug. The process, it may be observed, is honest; the new and uncoloured mortar speaks for itself. Next, and chiefly, these parts have been operated upon, fortunately still very considerable, which, though in decay and threatened with destruction, are yet capable of preservation. The malady which affects these frescoes is one common to the whole genus of wall-paintings. The surface or pellicle of the picture is in blisters, the whole of the mortar is disintegrated and ready to fall down on the floor as dust, and the entire picture must speedily die if left to its disease. To fix these flying particles and fleeting paints some glutinous medium is infused, and then, with a gentle but firm surface pressure, the loosened atoms of the picture are once more brought and bound together. Furthermore, pains are taken to remove the dust of ages by means of a soft brush or simple water, and finally some fixing medium is washed over the surface and into the pores. The composition used is said to be a secret, but we presume it may be the silicate known in Germany and in England as "Wasserglas." The same medium will probably be applied to the external stonework of the church, not only to arrest, as in our Houses of Parliament, further decay, but to prevent the percolation of rain from the exterior walls to the interior frescoes. The result of these operations, though not all that might be desired, is on the whole satisfactory. Without the use of brush or the addition of colour, the frescoes are wonderfully "refreshed," and they are moreover placed *en permanence*.

The two churches, while they still serve for religious functions, may be said to be now converted into museums of art. And in no other spot, not even in the Campo Santo of Pisa, can the early masters of the Italian revival be better studied. Frescoes by Giunta carry the spectator back to the petrified forms of Byzantium; *chef-d'œuvre* by the illustrious pupil of Giunta show how great an advance was made under Cimabue, a master nowhere else seen in equal maturity or grandeur. A third generation brings us down to Giotto; fortunately, the compositions which here attest the painter's creative power, symmetric arrangement, systematised treatment, and comparatively perfected style, retain much of their original character. Thus, we see the early school of Florence transplanted to Assisi, and in like manner the contemporary, but rival, masters of Siena find in the spiritual forms of Pietro Lorenzetti and of Simone Martini a conspicuous and honourable place on these truly historic walls. We feel grateful to Signor Cavalcaselle and his fellow-labourers for having rescued these precious remains from further mutilation and decay.

Little need be said of the now tenantless monastery attached to the Church of St. Francis; it was never rich in art, though, judging from the great refectory, which could entertain 250 guests at a sitting, it was bounteous in hospitality. Among the novelties which the dissolution brought to light were the prisons for the incarceration of refractory monks. A visit may also be paid to a small and prettily-planted cloister, where are stowed away cartloads of skulls and skeletons which for long years have cried aloud for decent burial. The monks have brought upon themselves their galling misfor-



tunes; the preceding narrative will have shown that, from lack of culture and from want of vigilance, they proved themselves the unworthy keepers of priceless treasures, and they have written on the walls, in the most debased forms of art, the low estate into which they had fallen. The story which the Church of St. Francis recounts is melancholy; originally set upon a hill as a light which could not be hid, its brightness was turned into darkness; the vow of poverty became first a mockery and then grew into a dire reality, until at last the whole city of Assisi presents a spectacle of mendicancy to which there is no parallel, not even in Italy.

#### THE ECONOMICAL LIMITS TO THE USE OF ROLLED GIRDERS.

**E**XAMPLES of engineering construction, especially those of roofs, are not wanting in which a sectional area of less than 2 in. is composed of more than one bar or plate. In other words, this absurdly small sectional area as built up is a compound instead of a simple section. It can be readily understood that, inasmuch as the compound or built-up section requires a certain number of rivets to unite the different bars or plates of which it is composed, and that as holes must be punched or drilled for these rivets, there is a corresponding loss of material incurred. This loss is directly proportionable to the difference between the gross and the net sectional area. For instance, if we take an angle iron 3 in. by 3½ in., and suppose it riveted to the flanges and web of a solid-sided or plate girder by rivets ¾ in. diameter, its gross sectional area will be 2½ in., while the net will amount to only 10 in., thus showing a loss of nearly 30 per cent. In this calculation the diameter of two rivets has been deducted, for although the rivets in the flanges and web can be designed so as to break joint in the drawing, yet, when the wrappers are taken into account, and the joints, it would not be safe practically to suppose that only one rivet-hole would come in the same line of section, but allowance must be made for two. Compared at first sight with the built-up section, the rolled joist has the advantage of dispensing with the riveting necessary to connect the web and flanges, since these are rolled all in one piece, and there is consequently no loss of sectional area. It would be more correct to say there is no loss of material due to rivet-holes, for it will be seen that there is in larger examples considerable loss of sectional area both in the web and flanges.

A rolled joist is essentially a girder, with parallel horizontal flanges, since in the process of rolling the depth cannot be altered. We are not putting any limits at present to the depth or the length of the joist, although practically the limits would be soon arrived at. Our object is to point out that were the capabilities of the rolling-mill unlimited in this respect, there would nevertheless be a certain span and load beyond which the employment of rolled joist becomes wasteful of material. Besides the uniformity of depth which must prevail in a rolled girder, the sectional area must also be maintained constant, since neither the width of the flanges nor their thickness can be varied, nor the thickness of the web. So far as a span of 20 ft. is concerned, or under, it is of no consequence whether any of these dimensions are varied or not; but when this span is surpassed, some greater coincidence between the theoretical and actual sectional areas of the girder at different points becomes absolutely necessary if economy in construction is of any moment. Theory dictates that in every girder which is subject to the ordinary conditions attendant upon these structures, either the depth or the sectional area must vary. It is in many instances immaterial in which of these dimensions the alteration is made, but one or the other must undergo it. The depth may be maintained constant provided the sectional area is diminished towards the ends of the girders in proportion to the strain; or the sectional area may be maintained constant, or very nearly so, if the depth be decreased towards the same points. The fulfilment of the former conditions gives the correctly-designed parallel girder, and of the latter the bowstring. Neither of these forms can be produced from the rolls. It is true—and the advocates for the employment of rolled joists lay great stress upon the assertion—that an unscientific approximation can be made to the former of these types, not by diminishing the sectional area towards the ends, but increasing it by the use of extra plates riveted to the flanges

towards the central part of the girder, which amounts to much the same thing. But, allowing that this increase of section can be obtained in this manner, the minimum or rolled section of the flange must still be constant, both in breadth and thickness. Moreover, when extra plates are riveted to the flanges in order to give an increased sectional area at the centre, the principle of the rolled joist is at once departed from, and it becomes, to all intents and purposes, a built-up girder, without possessing the advantages of that particular form.

It is not only in the flanges that a loss of metal occurs from the impossibility of varying their section, and also in consequence of their depth being uniform, but the web suffers as well. As the girder becomes longer so must its depth be increased, a condition which cannot be practically fulfilled without at the same time increasing its thickness. This latter dimension will be constant throughout the whole girder. Theoretically, with a uniformly distributed load, the strain upon the web of a girder at its centre is *nil*, and even with a rolling load of the same intensity per foot run its amount is not of much consequence. Rolled girders are more frequently employed to support uniformly distributed than moving loads. Consequently, the strain upon the web is nothing at the centre, and a maximum at the ends. The shearing strain at the ends is equal to one-half the total distributed load. Thus the sectional area of the web at the ends must be sufficient to resist this strain, and by the conditions of manufacture it must be constant throughout the girder, although theoretically the strain diminishes to zero at the centre. There is no need of pointing out the enormous loss of material which would occur in a girder of any pretensions to size, supporting a load of any consequence. This disproportion between the sectional area of the webs of rolled girders and the strains upon them must always remain, since the method which can be employed to vary the area of the flanges cannot be applied to the web. Theoretically, as the sectional area of the web must be proportioned to resist the maximum strain upon it, the loss of material in this respect is exactly 50 per cent. Practically it would not amount to quite so much as this, because there must of necessity be some material in the central portion of the web, but still the excess would be very considerable.

It will be conceded that the strongest girder is that which with a given weight of material will bear the greatest load under precisely similar conditions. Let us compare in this respect the rolled and the built-up girder, and as a datum to start from, let the span be 20 ft., and the depth 1 ft., which is not far from the limit of depth hitherto attained in the rolled section. Commencing with the flanges, it is obvious that since the net sectional area of both must be equal in either to withstand the same strain, the advantage lies on the side of the rolled girder, because the gross sectional area of its flanges is equal to the net area. There is no loss of material due to the connection of web and flanges. The built-up girder, on the contrary, is subject to a certain amount of loss due to the difference between the gross and net area of its flanges, and consequently the weight of material in the flanges must exceed that in those of the rolled girder in order to afford the same net sectional area. With a given net sectional area, therefore, the flanges of a rolled girder will be lighter than those of a built-up one. But, if the comparison be carried further, it will be found that what the built-up girder loses with regard to the flanges it will more than gain with respect to the web. In the example selected, taken from a trade circular, the thickness of the web of the rolled section is 9-16 in., whereas, in a built-up girder of the same area of flange and depth, ¾ in. is more than sufficient. Besides, the thickness of the web of a rolled girder must increase with even a very small increase of the depth, and must, moreover, be uniform throughout the entire girder; but this is not the case with the web or the built-up section. The thickness of the web of a plate girder, which is always in excess of the requirements of theory, need not be increased until the depth is nearly doubled. A few additional stiffeners are all that are necessary to give rigidity to the greater depth of the web.

In connection with the subject of the relative strength of the type of two girders under consideration of the same total weight, it must not be lost sight of that the strength of a girder of any form does not depend exclusively upon the actual

sectional area of either the flanges or the web, but is due in equal measure to the observance of the proper proportions between the span, the depth, and the breadth of flange. These nice adjustments are easily insured in the case of the built-up girder, but not in that of its rolled fellow. It is here that the former has an immense advantage over the latter, particularly when the dimension of the span exceeds 20 ft. The proper theoretical area between the various parts of a girder cannot be observed in those of the rolled form. Hence, in comparing a rolled and a built-up girder under the same conditions of loading and weight, the weight of the flanges of the latter can be decreased by increasing the depth without at the same time augmenting the weight of the girder in the same proportion. Briefly, the great difference between the two is that a built-up girder can be designed so that the dictates of theory can be very closely adhered to in practice, and a rolled girder cannot. The form and proportions of a built-up girder are the result of theory, those of the rolled section the result of practice. The exigencies of the manufacturing process virtually determine the relative proportions of a rolled girder. Some attempt is made to assimilate these to what theory would indicate as the correct proportions, but with very equivocal success. It is, in fact, not possible to roll a girder with a proper regard to these theoretical requirements.

Summing up the subject, it would appear that in the comparison we have instituted, when the span does not exceed from 10 ft. to 20 ft., a rolled girder will be cheaper than a built-up section, for although there may be a superfluity of metal in a part of it, yet the price per ton will be less than for built-up sections. When this limit is surpassed, the weight of the built-up girder of the same span and depth will be slightly less than that of the rolled girder. This supposes the ratio of depth to span not to be that which is calculated to give the greatest amount of strength. If the built-up girder be correctly proportioned, so as to reduce the strains to a minimum, it will be cheaper than the riveted section for a span greater than that already alluded to. The riveting together of a couple of rolled girders longitudinally, so as to double the depth, is a handy expedient as a makeshift, but in complete defiance of all theory. The material in the two flanges, which is then concentrated in the middle of the web, is so much waste metal, since it is situated at or near the neutral axis of the whole girder, and its leverage for resisting strains is reduced to a minimum. Other ingenious combinations of rolled girders are sometimes made. For example, two or more are placed side by side and united by horizontal plates riveted over the top and bottom flanges. This arrangement possesses all the disadvantages of the old box girder, which is now obsolete. It is quite impossible to get at the inside after the plates are once put together, and the same remark applies to the combination of rolled joists with regard to the spaces between the parallel girders. While, under certain circumstances, and within certain limits, rolled girders are exceedingly well adapted for constructive purposes, and could be employed to advantage by engineers to a much greater extent than they are; yet, whenever a girder is required to fulfil certain conditions which admit of a theoretical adjustment of sectional area of strain, they will not be found economical. In a word, if a girder of small span is required to be merely adapted to a given load, one or other of the ordinary rolled sections will be found to be both convenient and economical. But if the span and load are of sufficient importance to call for a design, the built-up girder, either rolled or open-webbed, is the only proper type to adopt.—*Engineer.*

#### THE COMMERCIAL VALUE OF SOME DISINFECTANTS.

**P**ROFESSOR FLECK, of Dresden, has been investigating the quality of chloralum, of which, as a disinfectant, so much has been heard. He states that it is made as follows:—A calcareous and slightly ferruginous clay is treated with crude fuming hydrochloric acid, and dissolved as much as possible. The concentrated liquid, after letting the undissolved particles settle, is decanted, bottled, and sold as "chloralum." It has its name from the chloride of aluminum it contains. The undissolved residue, just as it is left, is dried in leaden pans, and this furnishes the "chloralum powder." In the above chloralum-liquid wool or



wadding is immersed, saturated with it, pressed and dried, and this gives the "chloralum wool and wadding." The impurities of arsenic, lead, and copper are caused by the impurity of the solvent, hydrochloric acid, or of the apparatus in which the dissolving of the clay takes place. The real value of the contents of the chloralum bottles cannot be set above one-seventh of the price at which they are sold. The value of the chloralum powder sold in tin boxes cannot be fixed higher than one-fifth of the selling price, it being simply a dried waste product. A solution of 10grm. of alum in 1lb. of well-water replaces in all cases the above preparations, in which all constituents, except the chloride of aluminium, are impurities—viz., poison. To fix the value of chloralum as a disinfectant, equal volumes of sewer liquid were treated with chloride of lime, alum, sulphate of iron, chloralum, caustic lime, and chloride of magnesium, and the clear supernatant liquid tested with alkaline silver solution for its percentage of putrefying matter. The useful effect of these disinfectants and clarifiers is represented by the following figures:—

	Putrefying Matter.
Chloride of lime disinfects	100·0 per cent.
Caustic lime ...	84·6 "
Alum ...	80·4 "
Sulphate of iron ...	76·7 "
Chloralum ...	74·0 "
Chloride of magnesium,,	57·1 "

The disinfecting and clarifying effect of chloralum is, as we see, inferior to those of alum or sulphate of alumina and of green vitriol, both of which are considerably cheaper than the chloralum.

#### ASTROP'S PATENT SEWAGE DRYING MACHINE.

A NEW plan for facilitating the utilisation of sewage, patented by Mr. Astrop, has been tried at the sewage-works belonging to the Tottenham Board of Health, with, on the whole, satisfactory results.

The advantages claimed for the machine are that, by centrifugal force, it drives out the moisture rapidly and economically, the fertilising properties being retained, because no heat is employed. It is stated that when the machine is in a permanent situation, so that the sludge can be pumped or run into the machine continuously, it will dry it at a cost of 8s. to 10s. per ton. The sludge averages 95 per cent. of water, so that for every ton of dry stuff about 19 tons of water have to be driven off.

At the trial at Tottenham the machine was charged with about two tons and a half of sludge, and when set in motion the water was driven rapidly out, falling in a heavy shower for several yards round, and at the expiration of about twenty minutes, on the cage being opened, it was found to contain about two and a half hundred-weight of solid matter.

The want of an effectual method of drying the solid portions of sewage has been, up to the present time, the greatest drawback to its utilisation as a marketable manure, and the real cause of the failure of many schemes. Several processes of evaporating the moisture by heat have been tried; but they have proved too expensive, and rendered the sewage worthless as a manure. Air-drying in open sheds has also been tested; this method is very expensive, the labour in turning the sewage over day after day is enormous, and by the time it is dry all the fertilising properties have gone off by decomposition. The only way, therefore, to utilise solid sewage as a manure would seem to be to deal with it whilst it is fresh, drying it at once by some cold process before it has had time to decompose, thereby fixing the organic matters, at the same time that it also thoroughly deodorises it.

The old buildings on the freehold site of the proposed City Liberal Club in Walbrook are being removed. The architects who are now preparing competitive designs for the new club-house are required to send them in not later than the 24th November, after which date there will be nothing to prevent the erection of the new building being proceeded with at once. The building is to be in the Italian style, with a façade of Portland stone, which may be relieved with other stones, and with metal.

The Abbey Parish (Paisley) School Board concluded contracts on Tuesday week for the erection of a new public school at Johnstone, to hold 600 pupils, and to expend about £6,658 on the building.

## Civil Engineering.

**DOCK EXTENSION AT HOLYHEAD.**—The new warehouses and docks which were constructed ten years ago at Holyhead by the London and North-western Railway Company, at a cost of £100,000, having been found inadequate, the company have decided upon the construction of similar works on the opposite side of the channel. The new works are of a very extensive character, and the contract for their construction has this week been let to Mr. Bugbird, Carnarvon, a contractor who is identified with the new harbour works at Carnarvon.

**JURA RAILWAY.**—The works of the new Jura Railway from Besançon to Morteau are to be commenced next week. The company which has obtained a concession of the line is not in any way connected with the Paris, Lyons, and Mediterranean Railway Company. The new route will naturally shorten the railway distance between Paris and Geneva.

**INDIAN RAILWAYS.**—According to the official report to the Secretary of State for India of the Government director of Indian railways, there are now open in India 5,872 miles of railway, which have cost about £97,000,000, giving an average expenditure of £16,536 a mile. Of this length 727 miles are laid with a double line, and 5,725 miles on the 5ft. 6in. gauge. A further extent of 1,850 miles is now in course of execution, of which 817 miles will be on the 5ft. 6in. and 1,033 on the metric gauge. It has lately been decided that the Indus Valley line shall be constructed on the 5ft. 6in. instead of on the narrow gauge. During last year 312 miles of additional line were opened. The quantity of materials sent out from this country last year amounted to 118,245 tons, exclusive of ten locomotives and 85,499 tons of fuel. The Government were the chief consignors, having shipped nearly 60,000 tons for the State railways. Since the commencement of railway operations in India, about 4,700,000 tons of materials have been despatched to that country, of the value of £31,150,000.

#### COMPETITIONS.

**PAISLEY.**—On Monday the committee of the Paisley Town Council and the trustees of the late Mr. George A. Clark agreed to offer three premiums, of the respective amounts of £100, £50, and £25, for designs for the new Town Hall. The competition to be open, and plans to be lodged by 1st February next. Mr. Clark bequeathed £20,000 for the purpose of erecting a new Town Hall.

**THE HASTINGS TOWN HALL.**—The decision on these plans will be received with feelings of surprise by the competitors and all interested. At a special meeting of the Hastings Council on Wednesday, the Town-hall Committee, pro forma, presented the report which had been drawn up by Mr. Card, County Surveyor for Sussex. As this had been circulated as a "private" document amongst the Council, it was taken as read. The committee having ascertained that the cost of erecting the proposed Town-hall and Public Offices would far exceed the amount sanctioned by the Council (£10,000 and £2,000 extra to make a foundation on the boggy bottom) recommended that the Borough Surveyor should be instructed to send back the plans to the various competitors; that there should be no public exhibition of them; and that the whole subject should be referred back for future consideration. Mr. Hill, an architect, one of the few members who had always said that the buildings could not be provided at less than £15,000, reminded the Council of his previous contention, and he said they had put themselves in rather a ludicrous position in asking for designs for a building at £10,000 which could not be supplied for £15,000. He was interrupted by the Mayor, with the observation, "We are not upon that question now; it was settled by the Council." The report was adopted. The Mayor afterwards declined to supply information to the reporters as to the nature of Mr. Card's reports. It is, however, known that that gentleman thinks £20,000 would not be an excessive estimate. The very least thing that the Council can do, under the circumstances, is to send a fee to each of the competitors. They should do this in obedience to the dictates of justice, if not in obedience to the biddings of law.

## ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETIES.

**ROMAN ANTIQUITIES.**—The Vicar of Uttoxeter has written to the *Times*, recommending to the notice of the British Archaeological Association and similar societies a place which he has recently visited. It is called Avenches, the old Roman Aventicum, and is situated about four miles from Morat, in Switzerland, the place where, at the "Battle of Morat," the Burgundians were driven into the Lake, when the Swiss were fighting for their independence. At Avenches there are more Roman antiquities gathered together in a rude kind of museum than can be found in any place of its size. And not only so, the whole neighbourhood round is waiting for excavation, where the old walls form almost a perfect circle, and every effort of the spade turns up some object of priceless value. Being a little out of the usual route, Avenches is not often visited, but it is accessible from Neuchâtel by road, or if the steamer is taken from Neuchâtel to Morat, a pleasant drive of about four miles soon brings one to it. Its population is singular, consisting mostly of Jews.

**ROMAN REMAINS IN NORFOLK.**—A discovery of Roman pottery has been made in the centre of Norfolk. The new railway from Watton to Swaffham passes through a Roman camp at the distance of about four miles north of Watton. The outer ditch of the camp is distinctly visible in a depression on all four sides of a large square of about 200 yards on each side. The inner ditch is also, in places, visible. These two ditches were originally about 10ft. deep, and may be plainly seen on the sides of the railway cutting, where they now appear filled with dark soil, the soil of the country being the boulder clay. There is also visible, close to the top of the cutting, part of one of the camp streets roughly paved with the flints of the district. Almost in the centre of the camp, and about 8ft. below the surface, there was discovered, about six weeks ago, by the men while at work on the railway, a hole about 4ft. square, the sides of which were formed of oak planks, now black with age. The soil was carefully removed, under the direction of a local antiquary, to the bottom of the hole, and there were found successive layers of earth and pottery. Altogether about fifty Roman vases of different shapes and sizes were disinterred, with fragments of as many more. The depth of the hole was about 40ft., and it was lined with oak planks from top to bottom. A second hole, formed in a similar way, is said to have been destroyed by the "navvies." On Friday last a third hole was examined. About thirty members of the Archaeological Society assembled, and the day's proceedings were superintended by Mr. Barton, who opened the hole first discovered, and who read an interesting paper on the subject, and by Mr. Valentine, the engineer of the railway now in course of formation. About 3ft. from the surface of the centre of the cutting, which is here about 15ft. deep, two elegant vases were found of great beauty, and probably of great value. They were evidently placed in the holes with order and with great care, as many as fifteen having been found in the lowest layer, and those in the deeper part of the hole had been let down in baskets; the oak lining of the hole was made so as to endure for 1,400 years at least. The vases and vessels which accompanied the larger and supposed cinerary urns were such as are found in other Roman burying-places. It is improbable that three holes, carefully formed and of great depth, should have been made so close to each other, and in the centre of the camp, except for some important purpose; and the quantity of refuse is not sufficient to make it probable that these holes were middens. On the other hand, no vestige of human dust or remains has been discovered, either in the vases or in the soil surrounding, and it is unlikely that a burying-place would be formed in the centre of a camp; there were, however, found with the vases, horns, antlers, and skeletons of the heads of oxen and deer, old sandals, and bits of broken pottery, such as would not probably have been thrown in if the holes were resting-places for the ashes of the dead. Such were the reasonings of the archaeologists on both sides of the question.

**STOW-ON-THE-WOLDS.**—For a fortnight past the Rev. Canon Greenwell has been exploring some ancient British barrows near Stow-on-the-Wolds. Three of the peculiar long barrows have been opened, and also a round barrow. In the latter two bodies were found burnt in urns, of a different type to the Yorkshire barrows; and



among the bones contained in one urn was a bronze knife. Beneath the burnt bodies was a grave, in which was a very fine skeleton of an ancient Briton, in excellent preservation. The long barrows were most remarkable, having inclosing walls and chambers. The two first had been much damaged by people getting out the stones for walls. The present one in hand it is hoped will show some undisturbed chambers. Flint arrowheads, scrapers, &c., abound; but, strangely, no stone axes are to be found, only two small fragments having been met with.

**THE GLASGOW INSTITUTE OF ARCHITECTS.**—The seventh annual general meeting of this institute was held within the registered office, 157, St. Vincent-street, on Tuesday, Mr. George Bell, president, in the chair. The annual report and treasurer's statement were both approved of, and the following were elected as the council of management for the ensuing year, viz. :—Messrs. Alexander Thomson, Campbell Douglas, John Burnet, George Bell, James Thomson, John Baird, John Gordon, James Salmon, David Thomson, and John Honeyman. A meeting of the council of management was held immediately after the general meeting of the institution, at which Mr. John Baird, 112, West Regent-street, was elected president; Mr. Campbell Douglas, vice-president; Mr. James Salmon, auditor; Mr. James Sellars, junr., treasurer; and Mr. William MacLean, secretary.

#### SCHOOLS OF ART.

**MANCHESTER.**—The annual meeting of the Manchester and Salford Building Trades' Institute for Technical Education was held on Tuesday evening. The sixth annual report stated that in the session 1872-3 the marks of distinction earned by the students at the Government science and art examinations were 47. During the past session the number was 46; though one less, they are of a higher character, 12 Queen's prizes having been earned, as against 9, and 26 second class as against 22. The proportion of Government grant to the teachers also stands higher than last year. A comparison of the present with last session's list shows that many pupils have earned first-class prizes where last year they obtained second, and that others have advanced from the elementary to the advanced stage. The accounts show a satisfactory surplus.

**MOY.**—A meeting of the pupils and friends of the Moy and Drummond Science and Art Classes was held at Moy on Friday last. According to the report, in the Moy class, taught by Mr. Parks, twenty-four pupils attended the examination, eighteen of whom obtained first-class, with Queen's prizes, and five second-class passes. In the Drummond class, of eleven pupils, taught by Mr. Bell, former pupil of Moy National School, eight obtained first-class with Queen's prizes, and three second-class passes.

#### BOOKS RECEIVED.

*The Law and Practice Relating to Letters Patent for Inventions*, by W. F. AGNEW, barrister (London: Wildy and Sons), is a carefully compiled digest of the laws and regulations under which patents are granted. It also contains information respecting the patent laws in force in the colonies and foreign countries, and the statutes and rules of the patent offices. It is hardly too much to say that the book should be in the hands of every one applying for a patent; it certainly should be read by everyone intending to act as his own patent agent.—*The History, Structure, Economy, and Diseases of Sheep*, by W. C. SPOONER, M.R.V.C. (London: Lockwood and Co.), a book well known to all interested in raising sheep for 30 years past, has reached its third edition. It has been carefully revised, and numerous additions made, rendered necessary by the new breeds which have sprung into existence during the period which has elapsed since the publication of the first edition and by the changes introduced in the treatment and food of stock.—*Earthwork Tables*, by JOSEPH BROADBENT and FRANCIS CAMPIN (London: Lockwood and Co.), have been prepared (in the first instance for the author's own use) to facilitate the accurate determination of earthwork quantities in estimates for permanent works. They are likely to be of considerable service to civil engineers.—*The Safe Use of Steam* (London: Lockwood and Co.) is a cheap treatise designed especially for the

guidance of non-professional steam-users. If such people would only pay attention to the hints it contains, it is just the book for small builders, engineers, printers, and others, who have one or two men in their employ to attend to a single engine and boiler, knowing just enough about them to keep them going, and some day, soon, to bring about an explosion.—*Quantities and Measurements* (London: Lockwood and Co.), issued as No. 156 of Weale's Rudimentary Series, is designed by its author, Mr. A. C. Benton, as a guide both to masters and workmen to an easier method of taking quantities and measurements than that usually gleaned from books.

## Building Intelligence.

#### CHURCHES AND CHAPELS.

**ANERLEY.**—The foundation-stone of a new Congregational chapel at Anerley was laid on the 8th instant. The new building will be 126ft. in length, 56ft. in breadth, and 41ft. high from floor to ceiling, and is intended to accommodate on the ground-floor 780, and in the galleries 510. It will be faced externally with red bricks, having white Suffolk brick and Bath stone dressings, the style being Romanesque. The total height of tower and spire will be 149ft. The roof will be in one span, slated. At the north end of the chapel will be a semicircular apse the full height of the chapel, in which the organ and choir seats are to be placed. On account of the natural slope of the land, there will be two large vestries beneath the north end of chapel, separated by a movable partition, so as to be available for meetings, &c., measuring together 51ft. by 25ft. The amount of contract, inclusive of galleries, is £9,800; spire £869. The total cost, inclusive of land and extras, is estimated at £11,555. The architect is Mr. George Elkington, of 95, Cannon-street, City, and Anerley; builders, Messrs. Thos. Bowyer and Sons, Upper Norwood.

**BINGLEY.**—A new Wesleyan Chapel has just been opened at Bingley. The building is designed in the Gothic style, and contains on the basement floor—which is all aboveground at the sides and back—a schoolroom and classrooms. The floor of the chapel is reached by easy ascents of steps and slopes from the front road. On plan the chapel consists of nave, transepts, and chancel. In the front is a spacious vestibule, from which access is obtained to staircases leading down to the schools and up to the galleries, and in the rear are two vestries. Surrounding the chapel on three sides are galleries, three seats wide at the sides, and eleven seats in the front. The seats are all of pitch-pine. The pulpit is octagonal in shape, and is made of selected pitch-pine. At one angle of the building is a tower, surmounted by a spire rising to a height of 160ft. above the ground. It is designed in four stages, comprising respectively entrance door, staircase window, clock, and belfry windows. The schools will accommodate about 1,000 children, and sittings are provided for about 1,200 adults in the chapel. The whole of the works have been carried out from the plans and under the direction of the architect, Mr. J. P. Pritchett, F.R.I.B.A., of Darlington.

**BOOTLE.**—The foundation-stone of a Congregational church, which is in course of erection at Bootle, was laid on Monday. The plans, which are by Messrs. Francis and George Holme, of Church-street, Liverpool, were sent in under limited competition. The buildings will form, in their entirety, a group, consisting of a church, with tower and spire, double vestries, schools, and, at the south-west angle, the caretaker's house. The church is intended to accommodate 700 persons. The style of the buildings is to be Gothic of an Early Geometric character, rather Continental in type. The work has been contracted for by Mr. Samuel Webster, of Brasenose-road, Bootle. The cost of the church, with the expense of furnishing it and the erection of the boundary walls, is expected to be about £6,000.

**BRIGHTON.**—St. Margaret's Chapel, Cannon-place, Brighton, has been enlarged. The style of the new work is Renaissance, freely treated. There is a new chancel formed at the west end, with bold circular columns of red Penryn stone shafts on clean Corsham Down stone pedestals, with carved stone capitals, moulded caps, bases, and carved and moulded panels, supporting semicircular arches moulded and run in plaster,

&c. The north wall is divided into bays by pilasters in plaster, surmounted by cast capitals. The ceiling over the chancel is waggon-headed, and its surface broken up into octagonal panels, with raised and moulded ribs, all in plaster. The south side of the chancel has bold circular columns and square pedestals, all of Corsham Down stone; carved capitals, and ace-shaped moulded panels to pedestals. These columns support the south side of the chancel-roof, and do a like duty—with the addition of carved stone trusses on their sides—for the gallery on that side overlooking the chancel. A new reredos has been erected in plaster. The west exterior elevation is wholly of Box Ground stone enriched and pedimented, and is pierced with two semi-headed windows, and a circular window with curved and radiating stone mullions. The cost of the enlargement will be from £4,000 to £4,500. The contractors for the work are Messrs. Cheesman and Freeman, of Brighton. Mr. John O. Scott is the architect.

**DUCKLINGTON.**—The small church of Hardwick, a village ecclesiastically united to the parish of Ducklington, was reopened on Sunday week, after enlargement and repair. The church, which is dedicated to St. Mary the Virgin, originally of the beginning of the thirteenth century (of which date there is a fine font), had undergone every possible mutilation and alteration, until it had been reduced to a plain whitewashed flat-ceiled nave and chancel, the latter ending in a plastered wall, without any east window. An aisle has been added on the north side, having a lean-to roof; the flat ceiling has given place to an open roof of good pitch; the east and north walls of the chancel have been rebuilt, and a window of three lights, filled with stained glass, has been inserted; the chancel has been raised, and a small west gallery removed. The architect is Mr. Bruton, of Oxford, and the builder Mr. Barnes, of Witney.

**ECCELES.**—The foundation-stones of a new Wesleyan chapel and school were laid on Saturday afternoon at Eccles. The chapel, which will seat 1,100 people, will be in the Gothic style. It will be built of Yorkshire shoddies, with dressings of Stourton stone. The building will be surmounted by a spire. The architect is Mr. C. O. Ellison, of Liverpool, and the builder is Mr. James Leslie, of Bootle, near Liverpool. The school will accommodate 500 pupils in its principal room, and it will also comprise class and other rooms. The cost of the buildings is estimated at £11,000, exclusive of the spire, which is estimated to cost £600 more.

**HACKNEY.**—The Catholic Apostolic Church, Mare-street, Hackney, was opened on October 15th. It is a cross church, having a south aisle to the chancel, which is to be used as a chapel. Both the chancel and the chapel have apsidal terminations. The length of the church internally, exclusive of the apse, is 100ft., and it is 36ft. wide. The apse is 21ft. wide by 14ft. deep, making the total length of the church inside 114ft.; the transepts are 11ft. deep, and 30ft. wide. The flooring of the church is principally formed of cement concrete, but the central passage, cross passage in front of the choir entrance, and the lower and upper choirs, are laid with red and black Staffordshire tiles. The sanctuary is paved with encaustic tiles. The floor generally falls 1ft. from the western entrance to the choir steps, and the floors of the choir and sanctuary rise slightly towards the east, that the congregation may see and hear better. The entrance from the road to the vestries (which are spacious) is by a corridor at the north side of the church; in this corridor are situated a women's retiring-room, and all necessary conveniences both for the congregation and ministers. The house for the person having charge of the church adjoins this corridor to the north. The height from the floor of the church to the underside of the wall-plate is between 22ft. and 23ft.; the height to the underside of the ridge is 47ft. As the money to be expended was limited in amount, it was necessary to keep the building as plain as possible, and to rely on the forms for the general effect, in conjunction with the use of simple materials for varied colours. The mass of the church is of common stock bricks, with white brick lines, patterns, and arches exteriorly, and red and white brick lines, patterns, and arches, in the interior; the window tracery and west door are of Bath stone. Beart's moulded bricks are used for string-courses outside. The roofs are covered with Fareham tiles; the ridges are by J. K. Cooper, of Maidenhead; these are level through-



out. A simple flèche covered with shingles is placed at their intersection. In the interior the angle piers at the junction of nave, chancel, and transepts are of Bath stone, also parts of the arch, and responds to the sanctuary arch. The roofs are framed of fir, and are left unstained. The nave roof is a hammer-beam roof, with alternate trussed rafter principals over the windows supporting purlins, on which tongued boarding is laid instead of rafters, the central part having strong arched principals to sustain the flèche. The choir roof is formed of truss rafters, and the apse roof with collar-beam principals, with arched braces radiating to the several angles. The choir and chancel roofs are covered with diagonal boarding. The whole of the roofs are covered with asphalted roofing-felt under the tiles. The altar is of Caen stone, with red Mansfield columns and slab; the monogram and emblematic letters carved on it, and the spandrels between the arches are gilt, and painted by Mr. John Torpey, decorator, of Thornhill-crescent, Caledonian-road. The pulpit is of oak, unpolished, with a Bath stone base and steps. The seats and stalls are of yellow deal, stained and varnished. The faldstools and altar-stools are of oak, as is also the tabernacle on the altar. All these have been designed by the architect. The font and holy-water vessels have been brought from the old church. The works have been well executed by Mr. C. R. Turner, of Mansell-street, Aldgate, whose son, Mr. Charles Turner, has taken charge of the work throughout. This latter gentleman has worked with untiring zeal and energy to produce a good result. The carving remains to be executed. The foreman was Mr. J. E. Mariner. Sitings have as yet been placed only in the nave; these will seat 252 persons; they are 3ft. from centre to centre, and have sloping backs and seats. The church was designed to seat comfortably rather more than 400 persons, exclusive of the choir, &c. The total cost, including the churchkeeper's house, but exclusive of the organ, will be over £5,000. The architect is Mr. John Drake, of Rochester.

**RAWTENSTALL.**—The corner-stone of a new Wesleyan Chapel has just been laid. The building will be in the Italian style, from designs by Mr. Waddington, architect, Burnley. Accommodation will be provided for 470 persons, in addition to a gallery for 120 children. The principal material used will be stone from the local quarries. Mr. Walton, of Horncliffe, is the contractor, and the total cost will be about £1,400.

**ULVERSTONE.**—The memorial-stone of a new Wesleyan Chapel, at Grange, near Ulverstone, was recently laid. The building will be in the Gothic style. The estimated cost is £2,000, and the accommodation provided will be for 350 persons. Limestone with freestone dressings are the materials to be used. The architect is Mr. Ernest Bate, of Manchester, and the contractor, Mr. Alfred Crankshaw, of Grange.

**YORK DIOCESAN CHURCH BUILDING ENDOWMENT AID SOCIETY.**—The annual meeting of this Society was held at York on Tuesday. The report stated that the Society had made 1 grants in aid of three new churches, two of which—St. Barnabas's, Sheffield, and All Saints' Middlesborough—when completed, will accommodate 800 persons. The other grant was to a small agricultural parish, Faceby, where a new building was necessary. In three cases help had been given towards providing additional accommodation. The number of grants for parsonage-houses had been three—in Hull, Sheffield, and Middlesborough. Only one grant in aid of increased endowment had been made, and this showed that the cases where endowments were under £100 were becoming few. The average number of new churches in which the Society had helped during its existence was about  $4\frac{1}{2}$  annually; the average number of parsonages,  $5\frac{1}{2}$ ; and the increase of endowments,  $4\frac{1}{2}$ .

#### BUILDINGS.

**AIREDALE COLLEGE.**—The foundation-stone of the new Airedale College, near Manningham Park, Bradford, was laid on Friday last. Messrs. Lockwood and Mawson are the architects. The building is to be erected in the Geometrical style. The shape of the building will be nearly that of a double T. In the centre of the front will be the chief entrance, opening into a spacious hall. Occupying the extreme east of the building will be the assembly-room, 60ft. by 30ft., and with an extreme height of nearly 80ft. This room will be

fitted with vestries so as to be used as a chapel as well as a meeting-room, and will have a separate entrance. The contracts for the erection of the buildings have been let for about £14,000, and in addition to this it is expected that the place will cost £3,000 more.

**HELPERBY.**—The new Working Men's Institute at Helperby, Yorks., was opened on the 7th instant. The building is in the Elizabethan style, consisting of a cottage hospital, two cottages for small families, four almshouses, and a working men's institute, with two large rooms and a keeper's house attached, and a five court in the rear. The building has been erected at a cost of nearly £3,000. Mr. Keswick, of York, was the builder, under the superintendence of the contractor, Mr. Hodgson, of Helperby, and the architect, C. E. Sayer, of London.

**OXFORD.**—For some time it was an open question whether Oxford should be one of the great military centres under the new army organisation; but, this having been settled, the site for the barracks was selected and the contract arranged. The spot chosen is at Bullingdon, about two miles from Oxford. The barracks and grounds connected with them will occupy about twenty acres. The erection of the barracks will cost £50,000. Messrs. Downs and Co., of London, the contractors, commenced operations some months since, and the work is being rapidly proceeded with. The following is a sketch of the plan of the buildings, which are being erected under the superintendence of Captain Hurst, of the Royal Engineers. The "Keep," as it is called, is a castellated building with square projecting turrets at the angles, in all about 55ft. by 45ft. on plan, and 60ft. high. This contains the armoury and arm stores, cells for prisoners, and guard-room, &c. It is faced with Charlbury stone, with random courses, and the dressings are wrought stone of the same character. On the turret will be a cast-iron tank to contain 5,000 gallons. The construction throughout is fire-proof, cast-iron columns, wrought-iron girders, joists, &c., from Messrs. Measures Bros. and Co., of Southwark-street. The next building described in the specifications is the quarters for the major, sergeant-major, and eight officers, 110ft. long, 40ft. deep, and three stories high, with a roof of unusually high pitch. There are then several blocks of barracks, each for 112 men and four non-commissioned officers, the main rooms being 76ft. by 22ft., accommodating 28 men each, with the necessary staircase and other accommodation in the centre. The roofs are throughout the contract covered with tiles supplied by the Broomhall Tile Company, of Upper Ground-street, Blackfriars. Another group is the married soldiers' quarters, sergeants' rooms, and infant school, the whole 240ft. long, 26ft. wide, and two floors high, the living rooms for the married soldiers averaging 14ft. by 12ft. 6in., and the bedrooms 12ft. by 11ft. The canteen, the reading, and recreation rooms are separate buildings, also the hospital, each ward 47ft. by 24ft., and two floors high.

#### SCHOOLS.

**BRIERLEY HILL.**—On Friday last new Board-schools at Brierley Hill were opened. The architecture is fourteenth-century Gothic, and the materials used are red bricks and Codsall stone dressings. The buildings comprise a boys' school capable of accommodating 240 boys, a girls' school with room for 240 girls, and another for 350 infants—total, 830. Each school has a large classroom, and there are besides a Board-room, clerk's office, a library, lavatories, cloak-room, &c. The architect is Mr. Thomas Smith, of The Mount, Stourbridge, and Mr. Horton is the builder.

**EDINBURGH.**—Two new Board-schools are about to be commenced in Edinburgh. One, in the Water of Leith District, designed by Mr. R. Wilson, of Edinburgh, architect, takes the form of a central block, with two wings, which recede somewhat from the line of the main building; the frontage in all being about 97ft. in length. The centre part extends backwards 61ft., and the wings 32ft. The school will accommodate 350 children, and the cost will be £4,700. The other school, intended to accommodate 700 children (450 juveniles and 250 infants), is to be erected on a site situated at the corner of Lovers' lane and West Montgomery-place. The plans have been prepared by Messrs. William Lambie, Moffat, and Aitken, North St. David-street. The

style of the building is collegiate, of the Decorated period, the details being very plain and simple.

**GOOLE.**—On Monday the foundation-stone of a new Board-school was laid at Goole. The schools will accommodate 600 children. They have been designed by Mr. Watson, of Wakefield and Doncaster, and the contractor is Mr. Elliott, builder, of Goole. The design consists of three large schoolrooms, with classrooms, &c., a teacher's residence, and caretaker's house. The buildings are Gothic in design, and will be built of red brick, with stone dressings, white brick arches and bands.

#### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces. All letters should be addressed to the EDITOR, 31, TAVISTOCK STREET, COVENT-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

#### ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 9d. per line. Advertisements for the next week must reach the office not later than 5 p.m. on Thursday.

#### TERMS OF SUBSCRIPTIONS.

(Payable in advance.)

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom. To the United States £1. 6s. 6d. (or 6 guineas, 40s. gold). To France or Belgium, £1. 6s. 6d. (or 32 francs 60 centimes). To India (via Southampton) £1. 16s. To any of the Australian Colonies, New Zealand, the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1. 6s. 6d.

N.B.—American and Belgian subscribers are requested to remit their subscriptions by International P. O. O., and to advise the publisher of the date and amount of their remittance. If the last-mentioned precaution is omitted, some difficulty is very likely to arise in obtaining the amount. Back numbers can only be sent at the rate of 7d. each, the postage charged being 3d. per copy. All foreign subscriptions unaccompanied by an additional remittance to cover the extra cost of forwarding back numbers are commenced from the next number published after the receipt of the subscription.

RECEIVED.—S. C.—J. M'D.—C. and C.—G. S. J.—J. A. W.—F. G. H. S.—G. G.—E. A. O.—E. I.—G. W. R.—J. & Co.—J. B. L.—C. B. A.

**COTTAGE BUILDING.**—(INQUIRER.)—There are several works on the above subject, the best recently published works being Audsley's "Villa and Cottage Architecture," and "Villa Designs, &c.," published by Blackie and Co. A small treatise on "Cottage Building," by Allen in Lockwood's series, and one by Brooks on the "Erection of Dwelling-houses" in the same series, may be mentioned.

JAMES H. YOUNG. We have not published, and there is very little probability that we shall publish, an illustration of a "cremation apparatus."—ANCHOR (Why not drop a postage card and ask the price per 1,000 of Fareham's reeds delivered at the wharf, instead of wishing to occupy our space first with the question and then with the answer?)—J. H. C. (Your query, if inserted and answered, would be of no good to anyone but yourself, and we cannot afford the space it would occupy.)

## Correspondence.

#### CHURCH ARRANGEMENT.

(To the Editor of the BUILDING NEWS.)

Sir,—I cordially agree with you that polemics would be notably out of place in the pages of the BUILDING NEWS, and in a book which I recently mentioned, I have devoted to the word "Table," a long note on Canon lxxxii. (1604). I therefore simply wish to say that Church architects who adopt the term "altar" can plead unexceptionable authority. It occurs in a notice of faculty granted in 1724 in London, by Dr. Henchman.

Negotium concessionis licentiae sive facultatis ad altare decentior ornatum in cancellis erigendum (Crighten, Ordo Judiciorum, ii. 413).

I venture to question whether a deeper significance than "pure æstheticism" does not underlie "the substitution of the word bench for pew," as an open seat. Pew-rents are a scandal earlier than the Reformation. Bale mentions "church stools and pews that are well paid for." [Image: ch. xviii. § 12.] Now, happily, we have learned the truth that a church is both a House of God and the home of the people. Letting of seats and their



wholesale appropriation contradict it. People forget that symbolism is later in date than the things mystically explained. The low screen of all ancient churches was an almost imperceptible though efficient distinction between a nave and chancel. The high screen was a necessity for the exclusion of draughts from the occupants of the choir in a large building held by a religious community; but there the parish altar stood against its western face. The loft above it was required for reading the Gospel and Epistle, and addressing the people from the eastern side. Triforia were also necessary on occasions when great crowds were assembled in a minster; and have recently been so used at Westminster, Chichester, and Norwich.

Galleries, on the other hand, are innovations in parish-churches at once unsymmetrical, unsightly, and mischievous. Much of their weight rests upon the pillars of the arcade; they cut the aisle windows in two, obscure the light, and deaden sound; render the aisle accommodation gloomy, oppressive, and close, and place one half of the congregation at right angles to the other part. Openness, good ventilation, uniform arrangements, and ample light are indispensable to the life, order, and sustained attention of congregational worship and common prayer. Galleries well deserve their old name of scaffold, and have an unmistakable likeness to a playhouse.

If communicants would close up into the eastern portion of the nave, as the directions of the church plainly require, the difficulty would be solved in arranging the relative proportions and affinities between the nave and chancel, and so remove every conceivable or chimerical inconvenience. At Chichester Cathedral the communicants come up into the presbytery.

More expenditure on the breadth of the "congregational area" and less on extrinsic ornament would preserve us from constructional excrescences and the opaque stained glass which render the interiors of churches sepulchral and the use of a book a strain upon the eyes, or else necessitate the untimely alternative of gas, which lessens the weekly offertory and is injurious by its fumes to the health of the congregation.—I am, Sir, &c.,

MACKENZIE E. C. WALCOTT.

#### BELGIAN AND ENGLISH IRON IN BUILDING OPERATIONS.

SIR,—Your correspondent "G. G." is certainly misinformed as to the price tendered by the English firms for the ironwork of Messrs. Cockayne's new premises, Sheffield. We, being one of the firms who tendered, are in a position to state that our tender per ton was £6. 15s. less than your correspondent states the English quotations to have been, and consequently 35s. per ton below the price he says Mr. Bissett has to pay Belgian makers. We can further affirm that at the present time plates are to be bought in London from first-class English makers at less by 10s. per ton than they can be obtained from Belgium, i.e., quality for quality.

As one of the largest importers of Belgian joists, we may inform you that this speciality can be sold for £2 per ton less than by the English makers, and that for years we have sent rolled joists of Belgian make to Sheffield, Birmingham, Newcastle, Glasgow, and other iron centres.

We have no hesitation in stating that the iron used by the Belgian makers is more suitable for the joist section, and that these sections of Belgian iron are stronger than those of English iron of same weight, per foot.

ESTIMATE.

#### SALT WATER SUPPLY TO LARGE TOWNS.

SIR,—A paragraph in your last week's impression states that Dr. Yeld, of Sunderland, advocates the use of sea-water for sanitary purposes, and that several of the seaport towns are attempting to utilise it. Perhaps it will be interesting to your readers to know that the attempt has been made and successfully realised by Mr. J. P. Spencer, the surveyor to the combined boroughs of Tynemouth and North Shields, and has been in full operation for nearly three years. The water is taken at flood tide, fresh and pure, and is pumped to a high part of the town, about two miles from the sea, and from thence it flows back in pipes wherever required, having many connections with the sewers, which it thoroughly flushes. It is also used for street watering, and is con-

nected to the public baths, and into the bath-rooms of most of the private houses.

I believe the above is the only instance in the kingdom where this novel plan has been so thoroughly developed, and I understand many inquiries have been made to Mr. Spencer from other towns, and I find he very readily gives all the information his experience has gathered on this important subject; but I regret he has not yet thought proper to give a public description of the works, which I am sure would receive the attention it deserves as coming from a gentleman who is acknowledged to be one of the leading sanitary engineers in the North of England, more especially as I have heard it stated that he sees no reason why London, Manchester, Newcastle-on-Tyne, and other large towns should not have a daily supply of sea-water on a large scale, it being only a question of cost.—I am, Sir, &c.,

J. M.

Newcastle-on-Tyne, Oct. 19th, 1874.

#### ASPHALTE CLEANSING COMPETITION.

SIR,—Not having been in town for the last few weeks, I did not know that my aggrieved fellow-competitors had been writing to the leading professional journals in reference to the very shabby conduct of the promoters of this sham competition. I am happy to say I did not waste more of my time than just to give a rough idea or suggestion on paper; if every one had done the same, the committee would have had to pay for the modelling instead of their dupes. I trust this will be a lesson to some who contemplate competing for the new Rochester competition. By the way, the "ancient citizens" are fond of this little game, and have a very pretty notion of "how many beans make five." There will be the incidental expenses of railway fares, steamers, &c., and two months' hard work, and no doubt some few moneyed youths will even pay large sums for flashy-coloured perspectives which "go down" with these elvish coal-dealers!

What is the result of all this brainwork? Not even the satisfaction of knowing who is successful; as these committees generally ignore every one excepting their own pet man who has been in the swim from the first with the greater part of them.—I am, Sir, &c.,

FAIR PLAY.

#### TRURO WATER SUPPLY.

SIR,—I observe a paragraph in your impression of last Saturday to the effect that these works have been stopped, owing to the failure to obtain water. As engineer of the works under the Corporation, I beg to contradict the statement, as we have an abundance of water—indeed, so much so that we have been compelled to suspend operations until we can obtain sufficient pumping power to keep the water down so that the men may work.—I am, Sir, &c.,

EUG. BIRCH.

7, Westminster Chambers, Victoria-street,  
19th October, 1874.

#### CHIPS.

On Saturday the members of the Royal Archaeological Institute presented a gold chain of office to the city of Exeter, to be worn by the Mayor for the time being.

Mr. J. H. Parker, M.A., C.B. will give a lecture on the recent excavations in the Forum Romanum, the Via Sacra, and the Colosseum in Rome, on Wednesday next, in the upper room of the Ashmolean Museum, Oxford.

A correspondent of an American paper thinks the surest and cheapest way to make a rat and mouse proof granary is to lay brick with lime and mortar between the floors, and also the inside and outside boarding. Any old brick or pieces will do, if filled in well with mortar between them.

The Alcoa Society of Natural Science and Archaeology have just completed a new museum and public hall, which was opened yesterday.

We regret to have to announce the death of the wife of Mr. G. E. Street, R.A., on the 16th instant. The deceased lady was only 44 years of age.

New Board schools have just been opened at Strumpshaw, Norfolk. Mr. J. B. Pearce, of Norwich, was the architect, and Mr. Withers, of Blofield, the contractor.

The salary of Mr. Grindle, Borough Engineer of Hertford, has been reduced from £150 to £100 per annum, on account of the management of the sewage works having been let to the Sewage Phosphate Company. A proposal to reduce the salary to £75 was negatived by a large majority.

Claridge's Patent Asphalt Company are now engaged, under an order from H.M. Commissioners of Works, in concreting and asphaltizing, in a most substantial manner, all the court yards of Westminster Palace. They are some acres in extent, and are likely to occupy the Company's workmen until the next meeting of Parliament.

The approach to London-bridge is to be paved by the St. Saviour's Board of Works with new 3 by 9 granite cubes, at a cost of £859.

## Intercommunication.

### QUESTIONS.

[3508].—The Metropolitan Building Act.—Can any of your numerous readers inform me whether any recent amendments have been made to the Building Act of 1856, or any further regulations relating to buildings have been issued lately by the Metropolitan Board of Works? I should be greatly obliged for any such information.—T. H. T.

[3509].—School-Board Regulations.—Has there been any new code of rules published other than those mentioned in Mr. Robson's School Architecture; I mean in reference to the construction of new elementary schools, or do the rules of the Education Department still hold good? If any new Board-school rules have been published, I should like to be informed where I can obtain them. Perhaps Mr. Robson can kindly furnish me with the information.—T. H. T.

[3510].—Noiseless Pavings.—Can any one give me a list of the different patents out for the above object as respects our streets, and descriptions of them?—W. W.

[3511].—Carriage of Bricks.—Will any reader kindly inform me of the cost per thousand of the Fareham red bricks delivered at the wharf or station, whichever it may be, in London? What is the cost per ton per mile charged by railway companies for carriage?—ANCHOR.

[3512].—Slates.—Is there any good reason for the advance on slates now demanded by some slate merchants? If so, what are we builders to cover our roofs with?—A FOURTEEN YEARS' SUBSCRIBER.

[3513].—Petroleum.—A. and B. occupy contiguous houses. The dividing walls are distinct but close together, and B's house is deeper than A's. A supports against B's wall a tank of petroleum which B fears may explode and blow in the side of his house. Has B any remedy—provided that the oil in the tank does not give off inflammable vapour at a temperature of less than 100° Fahrenheit's thermometer—(34 and 34 Vic. ch. 105)?—K.

[3514].—Payment for Quantities.—Just before a builder completed a contract he became bankrupt, owing the surveyor a portion of the charge for quantities. Can the building committee pay the surveyor and deduct the amount with the omissions on contract from the sum to be paid to the trustees of the builder's estate? Also, could the surveyor demand payment of the balance from the committee without regard to the former question?—SURVEYOR.

[3515].—Front of a House.—What constitutes the front of a house? Some authorities say that the door must be at the front, others say that if the principal room window or windows are there they are sufficient to establish it; others affirm that the side which possesses the most ornamentation is the front elevation. Now, having a pair of semi-detached villas to build, which I wish to front the south, I am in a dilemma, because of having failed to read carefully the deed which accompanied the sale of the land, whereas I have discovered that one of the conditions is that any building upon it must front the east. By placing the principal doors, and particularly the windows there, the prospect from the houses is blocked, the internal convenience deteriorated, the main entrances are not of such easy access, and my fears for the letting of the houses would be very great. If someone will kindly consider and answer my question, they will greatly oblige.—W. H. R.

[3516].—Zinc Roof.—Some years ago I had a zinc roof laid on a shop, which was done so badly that on every wet day we are nearly swamped. What can I do with it? Would tar and sand be any good? Any information would be gladly received. As I have not a very long lease on the place, I don't want to be at the expense of relaying it.—A. B.

[3517].—Flow of Water.—Will any of your learned correspondents inform me what quantity of water will flow per hour through a 2in. pipe 720yds. in length, with a fall of 9ft. from the source to outlet? The greater part of the distance is in a straight line, but there will be four bends to nearly right angles.—WATERCOURSE.

### REPLIES.

[2471].—Traps for Sinks.—I have read "Thomas's" reply and that of "T. S." Can one of these correspondents inform me where I can see any improved trap of the kind described?—INQUIRER.

[3500].—Weather-Tight Casement.—The best kind of casement to prevent the driving in of wet is that in which the meeting-stiles are provided with a double rebate or a simple rebate with the addition of a metal tongue and corresponding groove, or simply a kind of hook joint. The bottom rail should also have a weather fillet, or be grooved on its under side to form a drip; the sill should also have a groove worked in the rebate. With these checks no wet need drive through a well-fitting casement opening outwards. Iron casements are made on similar principles of angle iron, the flanges being made to enter a corresponding hollow. Moline's patent rolled-iron bar casements are very good.—G. H. G.

[3501].—Drainage Works.—Querist does not say whether his pipe sewer will run full or half-full, or only



one-third full. A sewer running only one-third full requires a greater inclination than when two-thirds full. For a sewer of 12in. diameter running full or half-full, the velocity should not be less than 2ft. per second, and according to Table, 1 in 583 is the least inclination it should have,—say, for a 1,000ft. length, about 2ft. fall, though I should advise a fall of 3ft. —ARCHITECT.

[3502].—Portland Cement.—No cement face should be painted so soon as six months after finishing. A lapse of a year or two is necessary. If, however, the face were first coated with linseed-oil, and then painted, I do not think there would be so great a risk of blistering.—G.

[3503].—Tile Flats.—It would depend much on the size of the tiles used and their quality. I have known the joists placed from 3ft. to 6ft. apart. For ordinary tiles I should think 3ft. or 4ft. may be trusted, where there is not much weight, for a span of 17ft.—BUILDER.

[3505].—Brick and Tile Making.—H. Phillips is informed that there is a good treatise by Dobson in Lockwood's series treating of the above subject, a series of articles also has just appeared in the BUILDING NEWS fully describing the process.—G.

[3506].—Valuation of Tenement.—Weight and Measurement of Hay, &c.—"F. W. H." cannot do better than get Ryde's "Textbook," or one or two of the cheaper works in Weale's Series (Lockwood and Co.). If he wants to know how to find the measurement of any particular solid, I should be pleased to assist him.—G. H. G.

### LEGAL INTELLIGENCE.

CONDITION OF THE CITY STREETS.—At the Mansion House on Monday four of the City scavengers attended before the Lord Mayor, on a summons obtained at the instance of the Metropolitan Board of Works, charging them with having, in Gracechurch-street, unlawfully swept a quantity of rubbish over a grating communicating with a public sewer, contrary to the Act 18th and 19th Victoria, chapter 120. Mr. Baylis, solicitor to City Commissioners of Sewers, in whose employment the defendants are, appeared for the defence; and Mr. Fry, solicitor, for the Metropolitan Board. At the outset, however, an application was made by Mr. Baylis, to which Mr. Fry consented, to have the hearing adjourned. The Lord Mayor took occasion to say there was a principle involved in the matter of considerable public interest, for the 18th and 19th Victoria, cap. 120, section 205, expressly provided that no scavenger or other person should sweep or rake any soil, rubbish, filth, or any other thing into any sewer or drain, or over any grate communicating therewith, or into any dock or inlet communicating with the mouth of any sewer or drain, or into which any sewer or drain might discharge its contents, or into the Thames; and every scavenger or other person so offending became liable to a penalty of £5. He (the Lord Mayor) well remembered the time when the City authorities, while the City scavenging was done by contract, were accustomed to prosecute men employed by the contractors for precisely similar offences to that now charged, namely, sweeping scavenging into the sewers; and wherever a case of that kind was made out the contractor was invariably fined. It was possible that in the interval of adjournment now asked for and assented to on the other side, the City Commissioners of Sewers and the Metropolitan Board might come to some understanding on the subject in the public interest, seeing that the practice referred to seemed to be a reprehensible one. Mr. Baylis said the case of the Commissioners was that their men were not given to such a practice. Mr. Fry replied that the summons charged the defendants with sweeping the surface mud off asphalt pavements into a sewer vested in the Metropolitan Board. He added that the practice had been very largely on the increase since the introduction of asphalt. The Lord Mayor said the character of the streets in the City had been much changed of late, and people on foot had now at times to walk about in water. He hoped the parties on both sides would well consider the matter before the case was heard on its merits, seeing that it involved a principle which was increasing in importance day by day—namely, the purification of the Thames as far as possible from pollution. In the result the hearing of the case was adjourned until Monday next.

The new Anglican church at Brussels was opened on Thursday week. The church is built in the Gothic style of the thirteenth century, of red bricks, with white stone facings and window frames. The basement is of hard Lorraine stone. The interior contains a centre nave and two side naves, and is constructed of white Joux stone. The church was built at a cost of £6,000. A spire will be added to it. It will hold from 500 to 600 people.

A complete sanitary survey has been made of the city of Worcester. The survey occupied six months. Over 7,500 houses and premises were surveyed, and out of a total of 7,094 inhabited houses 815 were found to be in a condition detrimental to health. The nature of the sanitary defects comprised overcrowding, bad structural arrangements as to air and ventilation and the means of cleanliness and common decency, and dilapidated and unwholesome houses scarcely fit for habitation.

## Our Office Table.

PAINTING ON ZINC.—Herr Puscher, of Nuremberg, has recently invented a simple process, depending on the use of acetate of lead, which renders every kind of painting applicable to sheets of zinc. By mixing blacklead, for instance, with the salt, a very agreeable reddish-brown tone is obtained. It is by these means that the cupola of the synagogue at Nuremberg has been painted; and, for more than a year, during which this work has stood, the atmosphere has had no influence on the zinc sheeting of the roof. By the addition of other colouring matters, the lightest or darkest shades of grey or yellow may be produced. It is this circumstance which gives to zinc mouldings quite the appearance of being sculptured in stone. For writing with dark ink on sheets of zinc, the inventor employs a solution of chloride of copper. After a few minutes the zinc sheet is washed and then dried.

CARPENTERS' HALL.—Another ancient building in the City is about to give way to modern improvements. Carpenters' Hall, London-wall, is to be taken down, and its place will be occupied by a huge pile of offices or warehouses. A part of the building is already trenced upon by the new thoroughfare from Throgmorton-street to London-wall, through Drapers' Hall Gardens, and the remainder will be removed shortly.

OPENINGS IN HIGHWAYS BY THE GAS AND WATER COMPANIES.—The frequent interference with the efficient maintenance of the public roads in towns by the gas and water companies has long been a cause of complaint. Mr. James Lovegrove, the chief surveyor to the Hackney District Board, has recommended the adoption of a plan which will probably check the readiness of the gas and water companies to disturb the roadways in his district, and will relieve the ratepayers from the cost of their repair. It appears that one shilling per yard super. has hitherto been charged for making good the damage caused to the roads by openings for laying and repairing gas and water-pipes. Eighteen hundred such openings have been made in the Hackney District alone during the past year, and Mr. Lovegrove proposes that in future a charge of 2s. 6d. per yard super. shall be made for the repairs rendered necessary.

THE TURNERS' COMPANY.—The Master and Wardens of the Turners' Company, in continuation of their course in former years, propose to give this year a silver medal and the freedom of the City of London and of the Company to any one workman or apprentice in England who may send in the best specimens of hand-turning. There will on this occasion be three competitions, one for turning in stone, spar, &c.; the second for lapidary work; the third for brass. Under the word "stone" is included any natural substance of a mineral character, such as porphyry, granite, jasper, agate, serpentine, marble, alabaster, &c. The qualities which will be chiefly considered in awarding the prize in stone will be beauty of original design in shape and colour, accuracy of copying; skill in overcoming difficulties in regard to the material; and originality, novelty or special skill in any other particular as applied to that class of work. A bronze medal of the Company will be given to the competitor second in merit, and the Company's certificate of merit to the third. Lady Burdett Coutts has, in addition, given £25 for distribution in prizes. The objects sent in for competition are on view at the Mansion House this week, and the prizes, which will be awarded by Sir Gilbert Scott, R.A., Mr. Weeks, R.A., and Mr. W. V. Simons, will be distributed on Monday next by the Lord Mayor.

THE LATE SIR JOHN BENSON.—A well-known architect and civil engineer, from whose designs the Great Exhibition building at Dublin in 1853 was erected, Sir John Benson, of Montenotte, in the county of Cork, died a few days since in Alexander-square, Brompton, at the age of a little over 60. The son of Mr. John Benson, of Collooney, in the county of Sligo, he was born in the year 1812, and at an early age was brought up to the profession. While comparatively quite a young man he was appointed county engineer to the East Riding of the county of Cork, and subsequently engineer to the Cork Harbour Commissioners. He received the honour of Knighthood at the hands of the Lord Lieutenant of Ireland on the opening of the Great

Industrial Exhibition, with which his name, like those of Mr. William Dargan and the late Duke of Leinster, will long be connected in the sister island.

COUNTY SURVEYOR OF KING'S COUNTY.—Mr. Richard B. Sanders, C.E., has lately been appointed by the Lord Lieutenant of Ireland to the important office of County Surveyor for King's County. Mr. Sanders was at one time a distinguished student in the engineering department of the Queen's College, Belfast, and graduated with honours from the Queen's University in Dublin some nine years ago; since then he has been actively engaged in the various branches of his profession.

THE NEW GLOBE STEAM SAW-MILLS.—Mr. Spencer Hayward, late of Margate, has removed his business from that town to the East-end of London, and has erected in Copperfield-road, Mile-end, a new wood-working manufactory, of unusual dimensions. The main structure, which is three stories high, is 192ft. in length, 32ft. wide, and 40ft. high, with an ornamental and substantial frontage. Another large building with a separate entrance, will be in full operation as a cooperage in a few days. The manufactory is completely fitted up with machinery of the most improved description, by Messrs. Powis, James, Western and Co., and others. One machine for cutting hardwood logs up to 2ft. 6in. by 3ft. 6in. will especially attract the attention of visitors; it has cost over £2,000, and will make eighteen or twenty cuts at one time. Mr. Hayward has been at some pains to guard his premises from fire, and it were well if every saw-mill were as well protected. Two large iron tanks, holding 8,000 gallons of water, are erected in the highest part of the premises, and pipes fitted with hydrants laid on from them to every part of the building. Altogether, this new wood-working factory is one of the most complete and well-fitted of its kind.

WHITEHAVEN HARBOUR.—The north and west walls in the north harbour are being completed, and the contractor is removing the old north wall; it is expected that the enlargement of the north harbour will be open for traffic this year. The entrance to the wet dock is being pushed on, and the new embankment, connecting the north and south harbours, is almost complete.

A LARGE STRONG-ROOM.—One of the largest strong-rooms ever made has just been completed at Messrs. Chubb and Son's London works for the Argentine Government, and is now being got ready for shipment to South America. It is constructed of two shells with an air space between. The outer shell being made of boiler plates fastened by screw bolts and having protected joints; the inner shell being the cases of fire-resisting material. Entrance to the room, which contains about 1,100 cubic feet, is obtained by two massive doors of combined iron and steel, each door weighing nearly a ton, and secured by twelve bolts and three gunpowder-proof locks. The work is so well finished that the most delicate hand can lock or unlock these great doors with perfect ease.

SELF-LIGHTING GAS-BURNER.—A self-lighting gas-burner is on view at the Fair of the American Institute in New York. In it there is a little chamber beside the burner in which is placed a roll of paper, along which are dots of a harmless compound which will take fire by percussion. The end of this roll is carried up near the orifice of the burner; and by turning the cock, the uppermost match is lighted by a slight blow, thus igniting the gas. The device works well and remains operative as long as any of the roll of paper, the end of which is constantly brought into position by very simple mechanism, remains. The cost of the apparatus is said not to exceed that of the matches ordinarily employed.

ALL PROFIT.—An ingenious gentleman of Southampton, according to the *Metropolitan*, has invented a scheme by which the ratepayers shall evermore be free from rates, and his own name become immortal. He has submitted to the Town Council a plan of utilising sewage so as to raise fabulous profits. A few minor preliminaries have to be gone through, however, by the Town Council and the Government, such as buying 4,000 acres of the New Forest land, giving the gentleman a twenty-five years' lease, building a hundred houses or so for labourers, erecting some sewage pumping works, and paying all expenses for two years. After that period the ingenious gentleman will walk in and undertake to pay the future



expenses for the remaining twenty-three years. The town sewage is to be spread over 1,000 acres, and the proceeds will, no doubt, clear all expenses. Meanwhile the ingenious G. will quietly farm the other 3,000 acres free. The only reason the Town Council do not gratefully accept the offer is the idea that the clever one will be enriched—not the Town Council.

### CHIPS.

The opening *conversazione* of the Architectural Association will be held on Friday evening next at 9, Conduit-street, when the prizes won during the past session by the members will be formally presented, and it is expected that a short address will be given by the President, Mr. G. H. Birch, A.R.I.B.A.

The foundation-stone of a new Wesleyan Sunday-school was laid at Cardiff on Wednesday week. The building will accommodate 600 children, at a cost of £600.

Mr. Rimmer's plans for the erection of the new market at Widnes have been rejected by the Local Board, and those of Messrs. Pierpoint, Hughes, and Pierpoint, of Warrington, accepted. The estimated cost of the accepted plans is £2,500.

The foundation-stone of a new Wesleyan Day and Sunday-school was laid at Coalville on the 7th instant. Mr. T. Bolyer, of Nottingham, is the architect.

The Lutterworth Educational Trustees, at a meeting on Friday last, decided to accept plans submitted for the erection of new schools, by Mr. Smith, architect.

The erection of a new Free Library for Cardiff, which seemed in a fair way to be accomplished, has been abandoned, owing to the dictatorial conduct of the Marquis of Bute, who insisted on having the complete control of the building, the payment of £250 a year as ground-rent, and that he should select the architect to erect the building.

A commencement of the brickwork of a new reservoir at Pontefract, capable of holding 400,000 gallons of water, has been made. The contract for laying pipes, etc., has been taken by Messrs. Speight and Sons, of Leeds.

It has been decided to accept the tender (£23,540) of Mr. Easton Gibb, the contractor for the Lintrathen waterworks, for the construction of the Chatto reservoir for the Dundee Waterworks.

Extensive sewerage works will shortly be in hand at Southtown, Great Yarmouth.

The foundation-stone of a new Church school has been laid at Moss Side, Manchester. The building, which is to accommodate 730 children, will cost £3,300. Mr. John Lowe is the architect, and Mr. John Wilson, the builder.

A new Hospital for women is to be erected at Sheffield, at a cost of £12,000.

The altered plans for the new Board Schools at Drighlington, by Messrs. Lockwood and Mawson, have been approved by the Education Department.

The Eyemouth School Board have decided to proceed with the erection of new schools, and are having plans prepared for consideration.

The amount advanced by the Public Works Loan Commissioners, under the Education Acts, on School-board loans, was, at the end of the late financial year, £1,320,000.

The Campbelltown Burgh School Board on Tuesday week authorised the acceptance of offers for erecting a new public school at Millknowe, amounting to £3,162, and for an addition to the Grammar School to the amount of £1,806.

The foundation-stone of a new Unitarian Chapel at Nottingham was laid last week. The style is Gothic, and Mr. Stuart Colman, of Bristol, is the architect. The chapel has been illustrated in the BUILDING NEWS.

New Board schools have been opened at Dudley. Messrs. Davies and Middleton, of Dudley and Birmingham, were the architects.

The new reredos at St. Paul's Church, Cliftonville, Margate, was uncovered on Thursday week. It extends the whole width of the chancel, and its height is 13ft. It contains the Lord's Supper in *alto-relievo*, which has a diapered background. Its canopy is arched and gabled, with crockets, finials, and Latin cross. Mr. Dayman, of Vauxhall Bridge-road, is the sculptors and designer.

A clock tower has been completed at Stratton, near Micheldever, in memory of Lord Northbrook's son, who perished in the ill-fated *Captain*.

On Saturday afternoon the corner-stones of a new Wesleyan school chapel were laid at Preston. The cost of the new building will be about £700.

## The Timber Trade.

The wholesale prices of timber, deals, &c., are as follows:—

Flooring per square.

Best Yellow, 1½ by 6½ . . . s. d. s. d.  
" 2 by 6½ . . . 19 9 20 0  
" 3 by 7 . . . 13 3  
" 4 by 7 . . . 13 0 13 3

Do. grooved, tongued, and beaded.

Second Yellow, 2 by 7 . . . 10 6 11 0  
" 3 by 7 . . . 12 0  
Ditto white, 2 by 7 . . . 10 0

Per cubic fathom.

Petersburg lathwood . . . £ s. £ s.  
Riga, &c. . . 9 0 9 10  
Swedish firewood . . . 7 0  
Norway " . . . 5 5 5 10  
" . . . 3 10 4 10

Per foot run.

Norway poles . . . d. d.  
" . . . 1½ 2

Per 18ft. cube.

Riga crown wainscot logs . . . £ s. £ s.  
" brack . . . 5 5 5 10  
Memel crown . . . 4 15 5 0  
" brack . . . 4 15 5 10  
" brack . . . 3 15 4 5  
Austrian crown . . . 5 5

Per mille of pipe.

Memel crown pipe staves . . . 250 0 270 0  
" Brack . . . 200 0 220 0  
Canadian standard pipe . . . 75 0 80 0  
" puncheon per 1200 piece . . . 17 0 19 0  
Bosnia, single barrel per do. . . 31 10  
U. S. pipe . . . 50 0 72 10  
" hhd. heavy and extra . . . 30 0 45 0  
" slight . . . 18 0 21 0

Per load of 50 cubic feet.

Teak . . . s. d. s. d.  
British Guano greenheart . . . 220 0 280 0  
Australian ironbark . . . 250 0 270 0  
Pitch pine . . . 170 0 220 0  
Quebec large birch . . . 75 0 85 0  
St. John's " . . . 110 0  
Ash . . . 60 0  
Rock elm . . . 140 0  
Quebec oak . . . 120 0 160 0  
" red pine, building . . . 70 0 80 0  
" large yellow pine . . . 110 0 130 0  
" waney board . . . 110 0 130 0  
" small . . . 80 0 90 0  
Red Pine masts . . . 90 0 120 0  
Yellow Pine masts, large . . . 80 0 130 0  
Oregon " . . . 180 0 240 0  
Kawrie " . . . 160 0 220 0  
Norway spars . . . 40 0 60 0  
Memel Crown oak . . . 110 0 160 0  
" Brack . . . 105 0  
Dantzlg crown . . . 110 0 160 0  
" brack . . . 100 0 120 0  
Riga fir . . . 80 0 85 0  
Stettin fir . . . 60 0 70 0  
Swedish fir . . . 60 0 65 0  
" small . . . 50 0 58 0  
Memel and Dantzlg crown fir . . . 90 0  
" best middling . . . 80 0 90 0  
" common middling . . . 55 0 65 0  
" undersized . . . 55 0 60 0  
Swedish and Norway balks . . . 40 0 55 0

Per superficial foot.

Honduras mahogany, cargo avge. . . s. d. s. d.  
Mexican " . . . 0 4 0 5½  
Tabasco " . . . 0 5 0 6  
Cuba " . . . 0 6½ 0 10  
St. Domingo " . . . 0 7 0 10  
" curls . . . 1 0 2 0  
Cuba cedar . . . 0 4½ 0 5  
Honduras and Mexican cedar . . . 0 3½ 0 4½  
Australian do. . . 0 3½ 0 4½  
Pencil . . . 0 2 0 3½  
Italian walnut . . . 0 4½ 0 5  
Black sea " . . . 0 3½ 0 4  
Canadian " . . . 0 3 0 4  
Bird's-eye maple . . . 0 5 0 7  
St. Domingo satinwood . . . 1 0 1 6

Per ton.

Rio rosewood . . . £ s. £ s.  
Bahia . . . 14 0 20 0  
Puerto Caballo zebra wood . . . 12 0 18 0  
Ceylon ebony . . . 7 0 8 0  
Ceylon ebony . . . 12 0 18 0  
African billet do. . . 12 0 15 0  
Lignum Vitæ . . . 6 0 10 0  
Cuba cocowood . . . 5 0 7 0  
Turkey boxwood . . . 5 0 16 0

Per 120 12ft. 1½ by 11.

Wyburg, 1st yellow . . . 3 by 9 13 10 13 15  
" 2nd " . . . 3 by 9 13 0  
" 2½ by 7 12 0  
Archangel, 1st yellow . . . 3 by 9 15 15 16 0  
" 2nd " . . . 2½ by 9 13 10  
" 3rd " . . . 3 by 11 14 0  
Jacobstadt 1st " . . . 3 by 9 13 10

Jacobstadt 1st yellow	2½ by 7	£ s. 12 10	£ s. 13 0
" 1st white	3 by 7	12 10	13 0
" "	2½ by 7	9 10	
" "	3 by 7	9 10	
Petersburg, 1st yellow	3 by 9	15 10	
" 2nd "	2½ by 7	14 0	14 10
" "	3 by 11	13 0	
" 1st white	3 by 9	13 5	
" "	3 by 9	11 10	
" "	3 by 11	10 10	
" "	3 by 9	10 10	
Skelleftea, 1 & 2 yellow	3 by 9	14 0	
" 3rd "	3 by 9	12 10	
" 4th "	3 by 9	12 0	
Soderhamn, 1 & 2 "	3 by 9	13 0	14 0
" 3rd "	3 by 9	12 10	13 10
Quebec, 1st floated pine	"	20 0	
" 2nd floated "	"	14 0	
" 3rd floated "	"	12 0	
" 1st bright "	"	21 0	24 0
" 2nd bright "	"	13 0	14 0
" 3rd bright "	"	11 0	12 0

Per 120 12ft. 1½ in.

Memel, 2nd yellow, 10½ to 11 in. 12 10

Per 120 12ft. 2½ by 6½.

Dram, 2nd yellow . . . 9 15

" 3rd " . . . 9 10

Ljusne, 4th " . . . 9 0

Per 120 12ft. 3 by 9.

Quebec, 1st spruce 12ft. 3 by 9 17 0

" 3rd " 12ft. 3 by 9 10 0

" 4th " 12ft. 3 by 7 14 10

" 4th " 12ft. 3 by 9 14 15

### WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay.—For samples and further particulars, apply to the MANAGER, at the Quarries Narberth-road, R.S.O.—[ADVT.]

### TENDERS.

ACTON, W.—For completion of Nos. 5 to 8, Cumberland Villas, Acton Green, W., for Mr. Hy. Cooper. Mr. Edwd. Monson, jun, architect. Quantities supplied.

Rankin	£1,700 0 0
Simpson and Baker	1,661 0 0
Eydmann	1,650 0 0
Blick	1,524 0 0
Edsen	1,475 0 0
Temple and Forster (accepted)	1,475 0 0

BRIGHTON.—For new club in the King's-road, for the Brighton New Club Company, (Limited). Mr. Thomas Lanson, architect. Quantities supplied by Mr. B. H. Nunn.

Scrivener and White (too late)	£14,998 0 0
Brass	14,935 0 0
Waldram and Co.	14,890 0 0
Manley and Rogers	14,826 0 0
Dove Brothers	14,795 0 0
Browne and Robinson (too late)	14,750 0 0
Newman and Mann	14,720 0 0
Lockey	14,370 0 0
Merritt and Ashby (too late)	14,300 0 0
Cheesman and Co	14,078 0 0
Howard	13,970 0 0
Harnes (accepted)	13,720 0 0
Eldridge (withdrawn)	11,550 0 0

BROMLEY.—For the erection of new schools for the London School Board. Mr. E. R. Robson, architect. Quantities by Messrs. Gardiner, Son, and Theobald.

Wall Bros	£6,993 0 0
Wood	6,920 0 0
Williams and Son	6,867 0 0
Atherton and Latta	6,800 0 0
Kilby	6,565 0 0
Pritchard	6,535 0 0
Sheffield	6,456 0 0
Nightingale	6,287 0 0

CARDIFF.—For the erection of the Cardiff and County cub. Messrs. Wilson, Wilcox, and Willson, architects, Bath. Quantities taken out by Mr. A. Deane Bath.

Price	£4,250 0 0
Diment	4,200 0 0
Jones	3,960 0 0
Shipton	3,990 0 0
Jones and Allen	3,885 0 0
Beggs (accepted)	3,800 0 0
Concrete Co.	3,600 0 0

CROYDON.—For alterations at 125, Church-street. Mr F. T. Mallet, surveyor.

Legg	£483 0 0
Hyde	454 0 0
Wimp	425 0 0
Jarrett (accepted)	410 0 0
Surveyor's estimate	429 0 0

FINSBURY.—For building and repairs at Clifton-street Finsbury, for Mr. Geo. Tomkins. Mr. T. T. Green, architect.

House No. 25.	House No. 27.	Total.
Staines and Son £362 0 0	£22 0 0	£384 0 0
Vaughan	207 0 0	55 0 0
Heeps	313 0 0	35 0 0
		343 0 0

KNIGHTSBRIDGE.—For alterations and additions at No 12, Lowndes-terrace, Knightsbridge, for Messrs. Harvey, Nichols and Co., Limited. Mr. Alfred Williams, architect. Quantities supplied by Messrs. George Lansdown and Pollard.

Grimwood and Sons	£1,447 0 0	£250 0 0
Thom and Co.	1,360 0 0	50 0 0
Simpson and Co	1,360 0 0	80 0 0

\* Accepted.

## CHUBB'S STRONG ROOMS,

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## THE BUILDING NEWS.

LONDON, FRIDAY, OCTOBER 30, 1874.

## A BROAD-CHURCH IDEAL OF CHURCH-BUILDING.

OUT of the two great divisions into which religious thought all over Europe has separated itself—divisions which cut transversely through all churches, denominations, and sects, and in presence of which the mere external distinctions between Romanist and Anglican, Churchman and Dissenter, become day by day more trivial and unmeaning,—only one division has yet found any adequate expression in the sphere of Art. I speak of two divisions, for at bottom there are but two principles—the principle of deference to constituted authority, and the principle of investigation into truth; and the endless shades of opinion may all be traced to the working out either of the one or of the other principle with more or less of consistency, of completeness, and of mental power. Neither principle is exactly co-extensive with any religious body. The Church of Rome is commonly said to be based on the claim for deference to authority, and the Reformed Churches on the right of investigation of truth; but amongst the professed members of either, there are multitudes who ought, by this rule, to belong to the other. The popular designations of "High Church" and "Broad Church" approach much more nearly to an accurate division, at least if we include under the latter term all who insist on the right of personal inquiry into truth, however various may be the stages at which, in different cases, they have arrived; and if, for convenience sake, we extend these two designations beyond the limits of the Church of England, within which they first arose.

Of these two divisions, the "High Church" has allied itself to the Arts, and evolved a characteristic bodily form. The buildings which Catholicism produced in the thirteenth century may (as Mr. Street pleaded at the recent Church Congress) be made to harmonise with Ritualism in the nineteenth; for Ritualism and Middle Age Catholicism both belong to the same religious type. But they do not harmonise well with "Broad Church" beliefs, nor are they well suited to Broad Church purposes, whether within the Establishment or without it. They may be gems of art; they may enshrine the most precious memories of the nation, and the dearest associations of individuals; they may deserve to be kept with far more reverent care than this meddlesome age of renovators has deigned to yield them; but they are very far from being exact models of what is wanted in new buildings, save by extreme High Churchism in one or other of its branches. What this type of religion requires has been often and ably stated in this journal and elsewhere, and the wants of the opposite type are manifestly as fair a subject for discussion. In trying, however, to shape out some slight and general ideal for the Broad Church, in its widest sense, it need be no part of the task to impugn the principles of the opposite party, or to judge those, who, in another way, and not in this one, have tried to find some partial interpretation of "the Mystery that is Infinite." No architect can forget what they have done for his art, both in ancient and in modern times; and in art matters, at least, he will often find his warmest sympathies on the side of those who have fought so long and brave a fight against what is mean and ugly and sordid in modern civilisation. The further one is from what is known as Ritualism the more fearlessly he may avow his admiration of the artistic element in the Ritualist movement, and his conviction that

this side of it will remain a treasure and an inheritance, when its temporary and unreal side shall have passed away. If it is the good and not the bad in every system which keeps it alive; if "the old can never die till all the soul of goodness in it have got itself transfused into the practical new;" then surely the soul of goodness in ancient Catholicism and modern Ritualism consists to a very large extent in their artistic beauty. They lived, and have lived, very much for this—to protest for nobleness of feeling and grace of manner, in a world which always tends downwards to the ignoble and the coarse; and when they are gone it will be their epitaph that they gave their lives, "not for nothing—but for a divine something, other than they thought."

There are three things, says Goethe, that bear rule on earth: Wisdom, Beauty, and Strength. Now if the first aim (perhaps the more complete for its being partly unconscious) of High Churchism has been to follow beauty, moral or material, the first aim of Broad Churchism has been to follow truth. It represents that type of mind which cannot satisfy itself with legends, however touching, or with symbolism, however refined, unless it sees that the legend and the symbolism have a solid basis of reality beneath them. In that shaking of earth and heaven which these last three centuries have witnessed, it seeks to hold fast only to those things which cannot be shaken, and which will finally remain. And believing, like Goethe, and like that much older poet who has worked out the same idea in one of the books of the Apocrypha, that wisdom is first of the powers that rule, and that "truth is strongest, and doth abide for ever," it has given little allegiance to the second ruler of the world. But there is a value in beauty as well as in truth—in feeling as well as in intellect. The system which is content to have either without the other is an imperfect system, and "there is a providential order which forbids the final supremacy of imperfect things." Intellect may point out the road, but it is feeling which gives the impulse to walk in it; and the grand purpose of Art is to produce and control feeling. We hear it said continually that the purpose of Art, and especially of pictorial and sculptural art, was to teach; and then it is affirmed that as teaching can now be done much better by books, the reason for religious art has passed away. On the contrary, the reason for religious art remains as strong now as ever it was, though the form and the subjects of that art may be widely different from what they were in the Middle Ages. Both parties would admit this fact with regard to poetry, and even music; but only the High Church fully recognises it as yet with regard to architecture and the accessory arts, and avails itself of the vast amount of force which these arts can supply. The Broad Church (taking that designation in the wide sense claimed at the beginning of this article) has, comparatively speaking, cared for none of these things. It has addressed itself much to the reason, and this has been its strength; but it has addressed itself little to the feelings, except through the medium of preaching. Now there doubtless have been, and still are, preachers whose power over the mass of their audience is so complete, that it not only requires no external help, but that it can exert itself in spite of all external hindrances. Their hearers are borne away by an irresistible influence, and forget for the moment whether they are in a barn or a cathedral. But preachers of this rank will always be few, and those of a different order attain to this power only for moments, and at rare intervals. No preacher, moreover, can be always preaching; no poem can be always reciting itself; no music can be always sounding in men's ears; but architecture is never silent; its message repeats itself from century to century, and there is no speech nor language where its voice is not heard.

If the question, "For what purpose do you build churches?" were put to those who, in the most externally-diverse of religious bodies, unite in holding the fundamental principle of Protestantism, or, as it has here been called, of "Broad Churchism," the answers would doubtless vary much. But it is possible, I think, to find an answer to which all would agree as far as it goes, though some might add much and others little to its statements. This, the "greatest common measure" of Broad Church theories about church-building, might, perhaps, be stated somewhat as follows:—We build churches for the worship of God, and for the moral and spiritual culture of men. We build them for worship, though we worship a God who "dwelleth not in temples made with hands;" and we assemble in them, not because of any special sanctity in them or in what they contain, but simply because the building of them and the act of united worship in them are signs of, and helps to, the profoundest reverence which we know how to display. We build them for the moral and spiritual culture of men, whether that culture is carried on by means of the feelings or of the intellect; and whatever raises the soul to a higher level, or guides it to a truer judgment of right and wrong, may find a fit place in our buildings and in our services. This, then, or something nearly approaching to it, may, perhaps be taken as a simple and general outline of the Broad-Church theory of church-building. It shows us the principles by which we are to be guided in all doubtful matters. By these we may judge how far custom and tradition in church-building will help us, and where it is wise to depart from them: we may discern where our church-architecture transgresses the limits of our creed, and where it unworthily falls short of them. We may find a reason and a purpose for all we have to do, and attain at last some approximation to the highest Protestant or Broad-Church ideal.

I have purposely taken the very lowest ground, as regards theory, which would be likely to be held by any man, or any body of men, who felt public worship to be a duty. The theory is at the opposite pole from that of High Churchism. It involves no considerations of ritual, no belief in an altar or an ever-recurring sacrifice, no assumption of the localised presence of the Deity; but I think it is compatible with the fullest exercise of the arts, and the direction of them into nobler channels than before. The only postulate is that the art should have a basis of reality: that it should show forth and symbolise perennial truths, and not outworn traditions. So far as ancient religious art does this, so far, and no further, we may cherish and perpetuate it. Here, then, is a clear principle to go upon in deciding what to retain and what to exclude from a Protestant Church worthy of the name. The question is not whether this detail is common, and whether nobody will object to it, or whether this other feature is less hackneyed, and will be hailed with an outcry of "Popish" or "Pagan" by the unthinking crowd. The question is simply whether the one sets forth, and whether the other conflicts with, the actual living belief which has produced the church in question; and whether both are in harmony with that elevated and reverent spirit which befits all the accessories of public worship. It is true, indeed, that changes need to be made slowly and cautiously; that progress, even in an upward direction, must not be so rapid as to leave the mass of the people behind it; that old likes and dislikes cannot be got rid of in a day; and that the advance should be made by removing prejudices rather than by defying them. But allowing for all this, it would still be an immense gain to have it once clearly settled that there is a principle to guide us in such matters; to make it plainly seen that Protestant or Broad Church Christianity has an ideal of its own, and means to realise it; and that it is not content any longer



to follow High Churchism at ten or twenty years' distance. At present the common process is something of this kind. As Ritualism proceeds step by step on its return to the Church of Rome, it ever, and anon introduces some fresh mark of its relationship to that Church, and some fresh symbol or embodiment of the dogmas which that Church insists on. There is sure to be a great outcry at first: the public are terribly alarmed at the novelty; some of them write to *The Times*, and others, perhaps, take legal proceedings to put down the innovation. Neither method is particularly efficacious: the innovation remains: the public go and look at it: by degrees their aversion wears off, and they grow accustomed to it.

"Till seen too oft, familiar with its face,  
They suffer, then admire, and next embrace."

Nor is this all. The novelty comes into fashion, and whatever may have been its original purpose, whatever may be the dogma it was intended to express, it is caught up and copied from end to end of the kingdom, till no church is thought to be complete without it. It spreads from Ritualists to Evangelicals, and perhaps even from Evangelicals to Nonconformists, till its original promoters can have very little sense of humour if they do not enjoy a hearty laugh at some of its misapplications. And what is true of details is true of church arrangement as a whole. The common Mediæval church type—that of a nave with aisles divided off from it by a multitude of columns—was not even introduced by Ritualism, but has come to us straight from the Church of Rome itself. It was designed for, and it is expressive of, a ritual in which the altar was everything: nay, more, of a ritual in which there were many altars, and in which the work of the priests at these altars was held to be all that was essential, while the part of the laity was nothing. The first necessity, we are told, is that the congregation should be able to see an altar; and since on the conventional church plan a multitude of them cannot do this, it is now proposed by members of the extreme High Church party to have, once more, as in the Middle Ages, several altars in a church, and so to restore side-aisles, chapels, and transepts to what in many cases was their original purpose. In other words, the common church plan, with a nave and aisles, was designed for so intensely Ritualistic a form of worship that even the Ritualist section of the English Church hardly knows how to make use of it. If all the congregation are meant to join intelligently in one service, much more if all are meant to listen to a single preacher, the conventional church plan, with its long nave, its multitude of columns, and its deep chancel and transepts, is a dead failure. It was developed by the Roman Church for the Roman Catholic ritual, and it bears the stamp of its origin in every line. Its beauty, indeed, is as conspicuous as its unfitness; for the High Church, mediæval or modern, English or Italian, has always followed beauty, and it has had its reward. If there were only one type of arrangement in which churches could possibly be built without becoming mean, low, and unworthy in their artistic expression; if we had to choose, for instance, between the Mediæval church and the modern "tabernacle," I for one would a thousand times rather take the former with all its faults. But when we remember, not only that almost every civilised race that ever had a creed has embodied that creed in temples, mosques, or churches of enduring beauty, but also that the Middle Ages themselves have left us other types than the conventional one, types equally admirable, and infinitely better fitted to our purpose, we shall be foolish indeed to be satisfied for ever with following Ritualistic arrangements a stage or two behind. What sort of a church, and what sort of decoration, the Protestant or Broad Church principle might legitimately develop for itself, I shall attempt to sketch out in another article.

JAMES CUBITT.

## THE WINTER EXHIBITION AT THE DUDLEY GALLERY.

THERE could not be, to the would-be honest critic, a more difficult task than the reviewing of an exhibition of pictures at some gallery with a tolerable reputation, which he finds to be thoroughly commonplace. To quote the old saying, it is "ower gude for banning, and ower bad for blessing!" Here—perhaps in the place of honour—is a slight sketch labelled with a celebrated name. Your reviewer knows well that had any unknown man dared to send in anything so vile in drawing, so poor in colour, or so unintelligible in point of feeling, the hanging committee would have rejected it with scorn. There—skied, or relegated to the ground line—is a delicious landscape, by somebody whose name we never heard—why is it there? And next, our critic comes to some execrable daubs perpetrated by an intimate acquaintance! What is to be done? Must he risk the contemptuous pity of the *illuminati*, the derisive laughter of the *cognoscenti*, and the undying hatred of his comrades, by telling the truth? As Mr. Chadband remarked, "It may be so, my friends!"

And it is so! For, however we may incur the censure or contempt of the art world, we must affirm that the Oil Dudley, to give it its popular name, is exceedingly poor. Celebrated names appear certainly; but what do we gain when they are represented by inferior works? Some of the best men, e.g., Mr. H. S. Marks, do not contribute at all; and, generally, the exhibition is decidedly below the average. It would be out of the question to attempt to particularise works in so mediocre a display; the only possible way is to take the pictures in numerical order, and this we propose to do.

So, in No. 3, we are shocked by an awful study in black and white, by Mr. Regamay, which that gentleman is pleased to call "The Bivouac de Tirailleurs Algériens," &c. Mr. Lionel Smythe comforts us a little by No. 5 (Haymaking); the girl's figure is very good, only we never saw hay that colour! Next we come to a very delightful little landscape by Mrs. Edward Hopkins (No. 11), "A Walk near Ascot." No. 20, we presume, obtained a place because Mr. Richmond can write the magic letters R.A. after his name: it would have disgraced the outside of a penny gaff! Mr. W. R. Wyllie, in his "Antwerp Cathedral" (No. 22), has narrowly escaped a success; the picture has too great a oneness of grey light. In a "Welsh Homestead" (No. 23), Mr. Joseph Knight does not give us what we have a right to expect from his facile brush. He has several others far better: we do not mean No. 54, "A Summer's Eve," which has an air of poetry about it, but his other three are well worthy of attention. Next we are arrested by No. 30, "After Rain, Trefriw, North Wales," by J. Aumonier. It would not be saying too much for this picture were we boldly to assert that it is the best thing in the gallery. The foaming cascade, with its surroundings, is both well felt and well painted. Mr. E. F. Brewtnall's "Sindbad sees a Sail" (No. 31) is hardly worthy of the artist's known power; the flying drapery is decidedly hard and conventional. His "Storm Clouds" (No. 188) is much more to the purpose, and No. 338, "In the Glen," is charming—an unconventional bit of landscape, distinguished both by feeling and delicacy of work. In looking at "The Girl I left behind me" (No. 40), by Mrs. M. E. Staples, the only feeling is—no wonder! But this lady's work always suggests the lid of a second-rate French plum-box! Mr. Frank Walton in No. 46, "Crossways Farm," is so poor that he makes one wonder how he could have done anything so good as the transparent bit of light in "While the Morning's Cool" (No. 56.) Mr. J. Macbeth's "Study of Fir Trees" (No. 51) is hung so high that one cannot judge of what seems to be a clever

drawing. "The Postmaster-General's Office, Tangiers" (No. 76), by J. E. Hodgson, A.R.A., is, of course, clever—trickily so. Mr. Townley Green's "Bird's Nest" (No. 76) would have deserved praise had the figures been as good as the background. Mr. Henry, in No. 85, has utterly failed to appreciate nature—it would be perfectly impossible that the figures in the foreground should be in the shadow in which he has represented them whilst a light such as is given illuminated the lovely background. Mr. Buckman's "For the London Market"—a study of flower girls—suggests imitation of Mr. Maclean, whose "Flower Girl" (No. 93) is one of the best things he has done lately—the drapery in this is excellent. Had Mr. Robert Macbeth made a finished picture of No. 113, "While Fishing Boats lie nestled in the Bay," we can well believe how charming it would have been; unfortunately, it is only a sketch, and beautiful as are the tree on the right, and other parts, one feels that something more was demanded from such a painter.

We must draw attention to a cool and pleasant little landscape (No. 117) by Mr. Lexden L. Pocock; the water is especially good; also to a rather clever piece of decorative work by Miss Kate Carr, "Passion Flowers" (No. 142). The first thing that strikes one in Mr. Arthur Hughes's "Our Daughter" (No. 139), is its painfully pink tone; next comes a sensation of wonder why the principal figure should have flowing semi-classical draperies, whilst the subordinate characters wear dresses of Queen Anne's time. The manipulation is, of course, clever. We cannot profess much admiration for No. 146, "Psyche's Awakening," by Mr. E. J. Poynter, A.R.A.; the figure of Psyche is a secondary consideration, whereas the interest should have been concentrated in it; and although the landscape has some poetic feeling, the general effect is marred by a prevailing blue tinge throughout. A larger painting of the same school is Mr. R. Spencer Stanhope's "Banks of the Styx" (No. 163); exception may be taken to the drawing, and it is not very apparent why the two lovers should be tied together as if they were going to be thrown into the river instead of being ferried over; still there is so much beauty and poetry in their surroundings, that the picture is, on the whole, agreeable. Of Mr. J. T. Nettle-ship's "Tiger-cub" we prefer to say nothing. The principal attention will, naturally, be given to "Dawn and Day," by Mr. G. F. Watts, R.A. (No. 165). It is not so important, in point of size, as the artist's works in general, but the two allegorical figures are very beautiful, both in conception and in colour. Of the two we prefer the lower one, representing Dawn, as there is perhaps a tendency to copperiness in the other. Near this are No. 164, "A Lowland Fisherman's Home," by Mr. C. Napier Henry, in which the figures spoil an otherwise clever interior; two nice little landscapes, "Showery Weather," by Mr. Joseph Knight (No. 166), and "Holmbury-hill, Surrey," by Mr. Frank Walton (No. 167); also, as a clever bit of effect, No. 172, "Night on the Tistedals Elv," by Mr. J. Pain Davis. If it be true, as was rumoured, that Mr. Tristram J. Ellis has been assisted in his work by a well-known Academician and master of his art, all we can say is, "too many cooks spoil the broth," for "Rumbling Waters" (No. 210) is rather suggestive of a chromo-lithograph. Mr. G. A. Storey's "Enough is as good as a Feast" (No. 216) is an interior in his usual style, well painted, but rather deficient in interest; a woman holds up some pheasants which have just arrived, for the inspection of her master, who is already dipping off game. Mr. Townley Green's "Highland Stream" (No. 217), otherwise good, is rather spoiled by a slaty hue in the water. No. 230, "Street in Ludlow," by Mr. Andrew B. Donaldson, is one of that artist's most effective pieces, in a style in which he excels—the representation of



quaint old street architecture. In No. 244, "Golden Pippins," Mr. E. H. Fahey, always a clever painter of realistic landscape, shows an advance in power of figure-drawing. But this is rather thrown into the shade by Mr. Henry Moore's magnificent "Mediterranean in a Gale" (No. 245), a study, apparently, for his large picture in the last Academy—everybody must remember that blue, tumbling sea! In No. 254, "Sunny Days," Mr. Alma Tadema is not at his best; he seems not so fully to sympathise with modern England as with ancient Rome or Egypt. "He won't hurt you" (No. 259), by Mr. Heywood Hardy—a study of a little girl caressing a bloodhound, is in his happiest manner; the dog, of course, is splendidly painted, and there is humour in the self-important air of the child. Mr. Prinsep's "Autumn in the Isle of Wight" (No. 269) has so much that is excellent in colour, in drawing, and in feeling, that we cannot but regret the unfinished look which spoils it; to use a common phrase, it wants "pulling together." We should really like to know on what principle the hanging committee found room for Mr. Harry Goodwin's "Sea, above and below" (No. 281). We were, at first, uncertain whether it was a study in the Brighton Aquarium, or a design for one of the forthcoming pantomimes! Mr. J. J. Bannatyne has a good luminous painting (No. 283) of "Dunstaffnage Castle, Loch Etive"—the best thing of his we have seen for some time. Mr. C. E. Holloway's "Going Home" (No. 299) also strikes us as containing some of his best work, in one of those coast scenes in which he is so thoroughly at home. A good piece of grey, windy sea also is Mr. George L. Hall's "On the Beach, Brighton" (No. 312). It is a pity that Mr. Walter Crane should have spoiled an otherwise charming and poetic picture, "Cupid and my Dame" (No. 373), by the introduction in Cupid of so absurdly small a figure; it looks like a statuette; the colour is good. Mr. James Hayllar's "Visit to the National Gallery" (No. 394)—two old country people fast asleep—is as thorough a piece of clap-trap as might have been expected from the painter's known work. The Door Screen is chiefly remarkable as containing "A Fish-monger" (No. 398), by Mr. Alphonse Legros, with some wonderfully-painted fish, and Madame Cazin's "Evening" (No. 396), rather spoiled by the sky.

Having mentioned the foregoing pictures, we seem to have well-nigh exhausted the more striking features of the exhibition. In conclusion, however, we may mention, as worthy of a passing attention, the following works, viz.:—No. 144, "In the Villa Borghese, Rome," by Mr. Claude Calthorpe; M. Fantin's flower studies, especially No. 55, "Roses," No. 346, "Through the Wood," by Mr. A. B. Grahame; No. 105, "Dividing a Take," by Mr. J. B. Grahame, in which the drawing is very good; and No. 277, "Maidenhood," by Mr. William Wise.

## THE ARCHITECTURAL ANTIQUITIES OF ROME.\*

(SECOND NOTICE.)

PROMISCUOUSLY dipping into the splendid folio of Messrs. Taylor and Cresy, we will make a few further remarks. The fragments of temples that abound in the Eternal City have in the work before us a new life imparted to them by the graphic pencil and descriptive letterpress of Mr. Taylor. The publishers have also well seconded the author's endeavours, and every student who wishes to renew his acquaintance with the subject of Roman architecture cannot do better than consult this work.

To the account we gave of the Pantheon

last week, we may add some remarks in allusion to the inundations the interior is subject to by the occasional floods of the Tiber. On such occasions the effect internally is described as being magical, the interior and vault being reflected in this placid mirror with marvellous effect. The pavement is very irregular in its levels; portions near the columns are sunken considerably. It yet retains, however, indications of its sumptuous magnificence—remains of ancient marbles composed of squares with margins between, alternating with circles and squares of porphyry and granite, and bands of different marbles. Where the portico unites at the west side, an excavation disclosed a circular ambulaeum following the curve of the cell, and about 10ft. wide. Slabs of travertine stone 9in. thick covered this passage level with the portico; the slabs rested on walls about 3ft. thick. This ambulaeum led beyond the first door, and was there stopped by a wall parallel with the flank of portico, but supposed to continue beyond. The substructions of the portico were also brought to light; they are of large travertine blocks, the substructure of the cell being the same as above. The portico, 110ft. to outside of angle shafts, has systyle intercolumns, and is divided into twenty-two parts, and one-fifth, the latter fraction being added to the central opening, and the parts being each equal to the average diameter of the columns. The proportions generally agree with Vitruvius. Mr. Taylor does not state the entasis of the columns, which is very perceptible; but the proportions assigned to the architrave (epistylum), cornice, and entablature as a whole, are given; the latter is about a quarter of the height of column, including capital and base; the members of the cornice, architrave, and the depth of frieze, do not agree with the Vitruvian canon of proportion. Mr. Taylor thinks the height of pediment may have been determined by striking a segment from the two extreme ends of the cornice, the striking centre being level with the portico pavement; this rule appears to have been used in other Roman temples, as the hexastyle temple of Augustus, Nismes, and the tetrastyle Temple of Fortuna Virilis, in Rome. But whatever may be said by critics about this great work, few porticoes can compete with it, either in regard to its proportions or its general treatment. Its extreme simplicity, compared with other Roman examples; its plain marble frieze; its unenriched architrave; and its unfluted shafts of granite, besides the unique character of its mouldings, place it in the foremost rank of Classical Roman porticoes, as representative of Roman as that of the Parthenon was of Athenian art. Interiorly, also, nothing can surpass the exquisite beauty and proportions of the orders to the large and small altar recesses, the Corinthian capitals that adorn them, and the details of the attic.

Among the interesting examples illustrated the far-renowned Temple of Vesta, at Tivoli, cannot be passed over. Its very situation, surrounded with scenery of surpassing grandeur, and built on a prominent point of a rocky promontory of travertine stone, rendered more picturesque by the rushing torrent of the Teverone from the Apennine range, as it finds its way through ravine and fissure, gives this peripteral temple a more than historic interest. Commanding the cascade of the river within sound of its rushing waters, and its course through a defile of the richest description, the position of this structure is one that cannot be soon effaced from the memory. Close to the temple are the remains of a tetrastyle-prostyle temple of the Ionic order, supposed to have been dedicated to the Tiburtine Sibyl, but now turned into a church, the columns of the posticum being walled-up. The travertine quarries at Tivoli have been the chief source from which the buildings of Rome, about 18 miles distant, were erected. Carefully

measured drawings afford every particular of this beautiful little temple. The construction is of the work known as "opus incertum," the foundations being formed on arches, now inclosed. The stylobate, columns, entablature, jambs of doorway and windows, are of travertine, the whole having been covered with a thin coat of fine stucco, resembling marble in texture. From the inscription in the architrave, and Piranesi's restoration of it, and the fact, authenticated by Suetonius, that in the reign of Augustus the names of the directors or ediles of public buildings were inscribed upon them, it has been inferred that the temple was erected or repaired during the time of that Emperor. Plutarch says the circular form was given to the structure as expressive of the figure of the universe. The shafts of the columns are of several blocks, while the Corinthian capitals are remarkable for their massive outline and singular beauty; and it is noteworthy that the Basilica at Pompeii had the same capital. The peristyle consisted of eighteen columns, only ten of which remain. These are  $9\frac{1}{2}$  diameters high, and, according to Vitruvius, the diameter of the peripteral temple should equal the height of the column. This is so, the internal diameter of cell being 23ft. 11in., while the intercolumniation is of two diameters. The lacunaræ consist of blocks of varying size; thirty-six out of the hundred coffers only remain, and these do not agree with the disposition of the columns, as may be imagined. Two windows placed opposite the third intercolumns from the entrance lighted the cell, and the statue of the goddess probably occupied its centre. Another fact may be noticed, viz., that the architrave of the entrance does not partake of the curvature of the cell. A recess in the wall indicates the use of this temple as a Christian church during the Middle Ages. The Vitruvian precept that the interior face of the columns should be perpendicular appears to have been followed, while other proportions, the projection of the stylobate, and the details of the cornices, etc., generally accord. A restored elevation of this temple is illustrated, partly obtained from a bas-relief and from medals, which show a conical roof extending over the columns and having antefixæ, or tiles, round the edge of cornice. One of the most noticeable points about the order is the small depth of the entablature, which is only between a fifth and sixth part of the column's height. A beautiful detail of the capitals, to a quarter of the real size, are given, together with the massive festoons pendant from the heads of oxen that decorate the frieze. Details of the doorway and windows are also fully described; the architrave moulding and the cornice mouldings are especially graceful and elegant. Valvæ or folding-doors appear from the mortices of pivots to have been used. A peculiarity about the window should be noted; the outer cill follows the curve of the cell, but the architrave and cornice are straight. A diminution from 3ft. 5in. at bottom to 3ft. 3in. at top is marked as the window aperture, its height being 9ft. 9in.

We have not space to do justice to the elaborate details brought before us. The Colosseum, or Amphitheatre of Vespasian, is admirably described and illustrated in plan, section, and detail, and so fully, indeed, that a similar structure in all its colossal magnificence might be built from the carefully-measured drawings. If no other record existed Messrs. Taylor and Cresy's folio would amply sustain the splendour and merit of Roman architecture. When we remind our readers that the area of the Colosseum covers six acres; that its conjugate diameter measures six hundred and twenty feet, and the transverse diameter five hundred and thirteen feet; that its outer wall is one hundred and fifty-seven feet high, just the height of the main vault of St. Peter's, and nearly as high as the capitals of the peristyle

\* "The Architectural Antiquities of Rome," By GEORGE LEWELL TAYLOR and EDWARD CRESY. A New Edition. London: Lockwood and Co. 1874.



of our own dome of St. Paul's; that it is decorated with four orders—the Doric, Ionic, Corinthian, and Composite; that the travertine stone of its outer wall has for years been the quarry out of which the Farnese and other modern palaces of Rome have been reared; and that about one half of this great shell of masonry still remains to awaken the wonder of modern travellers, and to attest the constructive skill of the Roman builders, we may, at least, have said enough to arouse the interest of the young student of modern architecture to peruse the ample details given by Mr. Taylor, and possibly also revive the feeling among others, who have pondered over the colossal remains in earlier days, and who know it as one of those lions of Roman antiquity which the Classic architect can never forget. This immense edifice, erected by the Emperor Vespasian about 79 A.D., and finished by his son Titus in the wonderfully small space of time of three years, is first of all imposing by its magnitude, and secondly imposing to us in this advanced era as showing the resources of the Roman architects, both in appliance as well as in construction. It is supposed the floor of the arena was of timber, and this conjecture is confirmed by the position of the walls and cells. Marble seats ascended from the podium to the top of the second-story, and these were discovered in the recent excavations. The earth has since been thrown in, and the surface is now supposed to be level with the original arena. The size of the arena is given as 287ft. in its longest and 180ft. in its shortest diameter. To this arena eighty arched openings in the periphery led; the four main transverse openings were the widest, the one now existing having a span of 16ft. 4in.; the others are 14ft. 6in. wide. The walls, which contained the flights of steps, and which supported the seats, converge from the piers to the foci of the ellipse. The walls of the central openings are parallel, however, and form gusset spaces with the others, probably utilised as offices, &c. Four corridors extend round the building, though five existed; the two outer of them are open arcades constructed of travertine; the vaults over the corridors are of rubble and cement turned upon boarded centres, and thinly coated with stucco. Here we have evidence of construction that shows our own methods of vault-building are not new; while it incontestably points to a kind of concrete construction which we have again lately introduced as a novelty. Again, in the construction of the staircase-walls we find a very approved system adopted; piers of masonry are filled in with another and lighter sort of work; while we have other walls faced with tile in regular courses, bricks disposed in herring-bone fashion, and various devices that make the old adage true, "There is nothing new under the sun." In fact, if we study the elaborate sections in Messrs. Taylor and Cresy's book, we must admit that this huge edifice of antiquity combined within itself more of the higher principles of architecture than have been accorded to it. We see all the great supports of masonry, the filling-in with a species of rubble or concrete; the vaults, and stairs, and landings to the tiers of seats constructed of a substratum of the same material; stuccoed and tiled surfaces; a perfect system of drainage; mechanical appliances to raise the velarium, or awning, over the arena; and workmanship that must put to shame many modern edifices of as great pretension. When we compare this combination of science and skill with the latest modern building destined for more refined amusements—the Albert Hall—we are indeed forced to make a very unwilling admission, and to recall our boasted supremacy in art matters, at least. We do not mean to say that we could not equal such a work, were we called upon to erect one; we may even surpass it in some things; but the question is whether our work is at all commensurate with our increased experience. We take leave of this book with a hope that the great labour

bestowed upon it by its authors and publishers may be adequately recognised by the profession, archaeologists, and students generally; and we may repeat, that if no other record existed of the remains of ancient Rome than this work, we could not desire a better one.

#### LECTURES ON ART AND ARCHITECTURE.—IV.\*

By ALEXANDER THOMSON, I.A., ARCHITECT, GLASGOW.

IT has been asserted that the Romans had no native art, and that what is known as Roman art was really the work of Greek artists under Roman influences. How far the first part of the assertion is strictly matter of fact we cannot tell, but there are strong reasons for doubting the second part of it. We know that the products of Greek art—not merely such objects as pictures and statues—were transported to Rome to an almost incredible extent, and that even whole buildings were taken down, stone by stone, and re-erected in the Roman capital. We know also that the very artists were caught and taken there, in order that they might practise their art under the eyes of their masters, and perhaps through time even work under their inspiration. There were poets of Rome who imitated those of Greece, and in like manner there were Roman sculptors and architects who, sensible of their own poverty, could not help appropriating the results of Greek intelligence; and thus it is that we cannot in every instance distinguish between the work of Greek artists under Roman, or Roman under Greek influences. But one thing is very evident, that however much the best of what we call Roman art may resemble the Greek in its general appearance, its motive is totally different.

I mentioned in a former lecture that a large proportion of the finest of the sculptures of the Parthenon were placed in such a situation where they could not be seen to advantage, and that some of the very best parts could not be seen at all, but that the Greeks explained such anomalies by saying that "the gods see everywhere." There are no such perplexities about Roman art—nothing to suggest that the Roman artist troubled himself about any of these things, or believed that the gods could see anywhere. The Romans were a thoroughly practical people; they worked hard and ate heartily, and made the Basilicas, where they transacted their worldly business, of greater importance than the temples of their gods. Instead of cherishing in their hearts a feeling of reverence for the gods, and rendering a humble obedience to the divine laws, they would submit to no higher power, but set themselves up as rulers and governors over their fellow-men, extorting from them the most unquestioning allegiance. They fought with all who would fight with them, and set their heel upon the necks of those who would not. If they were not fighting abroad, they were contending with each other at home, either in political faction or in trying to outvie each other in the eyes of the people by ostentatious displays of wealth and power. This desire of theirs to become gods to other men gave a fulness and breadth to their actions not unbecoming their high pretensions. Wherever they went to conquer and cast down, they also set about organising and civilising. Besides military works of great magnitude, they made roads and bridges, built aqueducts and baths, hollowed out or erected amphitheatres, established markets, and opened up channels of communication with all parts of their vast empire. This restless spirit of action was not likely to produce the highest kind of art. It did not look upwards for inspiration, but outwards to command. It did not wait to inquire what the divine law might be, but without the least hesitation gave forth its own law. Mystery was henceforth abolished; art became a matter of business between you and me, as it were, or between master and slave. What was wanted was something like such and such a thing, and must be done by a certain time. Thus the ideal perfection which was aimed at in Greek art gave place to matter-of-fact and utility in the art of Rome. The painting which has been preserved to us so wonderfully on the walls of the houses of Pompeii is for the most part pure Greek, and, however beautiful, must rank as greatly inferior to the best period of Athenian art.

Roman sculpture has a character of its own quite distinct from the Greek, and may pos-

sibly be as nearly allied to Etruscan as to Greek. Indeed, it is not impossible that it was to a great extent the work of the Etruscan race which had been absorbed into the general mass of the Roman people. Amongst the most recent acquisitions in the British Museum is a very remarkable specimen of sculpture. It is an Etruscan sarcophagus, found in one of the tombs of that ancient people, which, although composed merely of burnt clay, and painted in natural colours, is almost as fresh as when first brought from the studio of the artist. On the lid is the figure of an aged man, in a reclining position, with a female figure kneeling beside him. They are almost life-size. The male figure is nearly nude, and very much emaciated; and the modelling is of an extremely naturalistic kind, showing the lines of the shrivelled skin upon the face and the hands and feet with a degree of minuteness quite remarkable. The head is small, and the expression of the face feeble; the hair is painted nearly white, and the skin dark red. The whole appearance of the figure is peculiar, and different in character from any race with which we are acquainted. The female figure, on the contrary, looks quite like a Greek—well modelled, draped in lady-like costume, and painted of a fair complexion. Around the sides of the sarcophagus are subjects in low relief, in which the male figure on the lid can easily be distinguished as the hero. These are treated with a degree of artistic skill greatly superior to the hard realistic modelling of the male figure of the principal group.

We know little of the Etruscans except from their tombs. These and their contents are deeply interesting, showing a style of art bearing such a striking resemblance to that of Greece, that we must suppose either that they had a common origin, or that the one was very strongly influenced by the other. But, whichever was the case, there can be no doubt that Roman art is greatly indebted to both. What we know of it belongs almost entirely to the period succeeding the conquest of Greece and the consequent decline of Greek art; and, while bearing palpable evidence of Greek education, its motive is totally different. In the last days of Greek art ordinary portraiture was regarded as a thing scarcely to be tolerated. Their public places were thronged with the finest models of idealised humanity, and their young people were encouraged to frequent those places, and, as it were, to associate with those embodiments of high excellence, in order that their manners and bearing might partake in some measure of the grace and dignity for which these noble works were distinguished, just as the youths of our own time are led into familiar intercourse with good society for the sake of the influences which may be imparted to their susceptible natures by contact with their betters. On the other hand, portraiture was the special province of Roman sculpture; and in the statues and busts which have remained to us we see a stern, almost grim, reality, which brings us at once from the pure regions of imagination, and from converse with the gods, to speculate upon the relentless doings of those hard-headed determined men who conquered and beat down all the nations round about them, and turned not aside until their sword had devoured all who had the courage to withstand them, laying the whole known world prostrate at their feet. While it fared so with sculpture, architecture could not be expected to go on throwing off all inert or excrescent matter as it had been doing under the highly-refined intellects of Greece, but it became itself an excrescence under the hands of the Romans, to be in its turn thrown off when the vital principle had forsaken it, and had passed into the really essential forms of the new structures which an entire change of manners had called into existence. As soon as the Romans had got architecture under their control it assumed an expression wonderfully like their sculpture in several of its characteristics, whilst in others it exhibited that kind of voluptuous fulness of habit which critics, in speaking of a certain kind of modern literature, designate as "fleshy." It is often found lending a gorgeousness to displays of wealth and patrician pride, but never sanctifying religion with any holy ray of spiritual truth. The delicate curves of the mouldings, which a perfect familiarity with the lines of the human frame enabled the Greeks to draw, gave place to a coarse, bold style of moulding, more in accordance with the rough-and-ready habits of the Romans. Had the question, Can art be taught? been put to the Roman architect of those times, he would have answered, without

\* Delivered at the Glasgow School of Art and Haldane Academy.



hesitation, in the affirmative. He would have explained with perfect clearness the rules for setting up each of the five orders, and shown you a simple and unerring mode of drawing every moulding by means of compass and square. He would point out how infinitely more scientific was his mode than that of the Greeks. This art, which had hitherto engaged the powers of the wisest and ablest of men to investigate its mysteries and exhibit the operation of its laws, was now to be popularised. The law-loving, law-making Romans could not permit the laws of architecture to remain dependent in a vague, unsettled kind of way upon the life and practice of some favourite of the gods, and to be appreciated only by men of cultivated minds. They resolved that these laws should forthwith be codified, so that they might be administered by the appointment of the magistrates, and rendered serviceable to the State; that they might be used to facilitate building operations, and be set forth in such plain characters that all men might read and know them. Instead of raising the general level of public taste, the standard of merit was lowered to meet the existing state of things. Whatever was too fine to be readily comprehended was forthwith omitted. Instead of leaving the imagination to strike an average between the bold and tender contrasts of light and shade, which we observed in the members of the Greek entablature, the Roman architect saved the spectator this trouble by striking this average for him. While the projections are equally bold, the extremely tender points are altogether abolished, and no part is made so fine but that it may be readily made out at a glance. In lieu of the skilful contrast of broad and narrow lights and shadows, there is a safe and easy gradation of parts between the small and great which neither excites the admiration of the learned critic nor disturbs the self-complacency of the ordinary observer. The Greeks had three distinct styles or orders; the Romans flattered themselves that they had increased these to five, but the boast is scarcely justified by the fact. The Doric of the Greeks being much too fine for Roman optics, they produced a Doric of their own—a good, sensible, every-day-looking article, quite intelligible to ordinary minds, and not requiring more than the skill of ordinary workmen to put it into shape. But not content with this, they contrived something ruder still—by leaving out the triglyphs and making certain modifications on the mouldings and proportions of the Doric, they fancied the change so great as to justify their bestowing upon it a distinct name, so they called it the Tuscan order. After all, it is a mere variety, and never attracted particular attention. It has rarely been used in this country. The other supposed addition to the orders is what is called the Composite order, which consists of a most unhappy combination of the Corinthian and Ionic orders, but, like the Tuscan, it was never regarded with much favour, either in ancient or modern times. The Roman variety of the Ionic does not reflect much credit on the taste or skill of those who manipulated the elegant Greek into the more commonplace form required for Roman purposes, and so it did not fare much better than the Tuscan or Composite. The favourite order of the Romans was the Corinthian, and its best examples exhibit a degree of beauty which places it in the foremost rank of those typical forms which must continue to command the admiration of refined minds throughout all ages. The finest example is that known as the Jupiter-Stator in Rome. Very good judges prefer it to the Greek example of the Choragic Monument of Lysicrates, and in some respects this may be admitted. The element of contrast is more skilfully managed in the Greek, but the parts are somewhat weak and thin towards the top; on the other hand, while the Roman is more complete, it is lacking in the element of contrast, and is rather too much elaborated. Indeed, so much is this the case, that the entablature, though rich and beautiful in itself, is rather scant and poor in comparison with the capital. Some parts of the entablature are decidedly inferior in design to the capital, and look as if a different hand had intruded into this marvellously fine work. While we miss the profound wisdom and artistic skill of the Greek—expressed with such precision and delicacy in all that he did—we find the ardent and energetic character of the Roman was as unmistakably impressed upon the works of his hands. The carving of the capitals, consoles, friezes, and enriched mouldings has an air of gorgeousness about it, which is quite peculiar, and in its way quite unrivalled.

The purely structural character, which is so distinctive of Grecian architecture, very soon disappeared under the Roman management. As the Romans increased in wealth and power, the worship of gods, the practice of virtue, and the pursuit of wisdom ceased to occupy their minds, or fully to satisfy their desires; they required gratifications of a different sort, they called for excitement, for novelty, and for variety in their amusements. These, added to the varied requirements of the complicated affairs of a great empire, led to changes in the forms of their buildings to which the architectural forms at their command could not very readily be accommodated. They had little of that creative power which the Greeks had wielded with such freedom, and so they adhered tenaciously to forms which, however beautiful in themselves, became utterly ridiculous from the incongruous manner in which they were mixed with a strange but vigorous growth which began to be seen sprouting from below, filled with the vernal juices of a new era. A radical change was taking place; the architecture of the ancient world, which through long ages had been little by little ridding itself of everything of a mere accidental or meretricious character, and by a process of centripetal consolidation had approached that state of settled tranquility which rests upon the perfect law of God, was now to be broken up from that sure foundation. The progress of the art was henceforth to take the opposite direction, and, as it were by centrifugal dispersion, to be driven outwards even beyond the vague circumference of æsthetic movement into the whirling circle of perpetual change, guided only by human caprice. The chief cause of this great change was the adoption of the arch as an architectural feature.

There was a time, and that not very long ago, when it was usual to give the Romans the credit of inventing the arch, but more recently it has been discovered to have been used by the primæval bricklayers of Egypt and Assyria long before the Romans were heard of. Indeed, the arch is essentially a bricklayer's contrivance, and although there are several examples of it in stone and marble which, under specially favourable circumstances, have come down to us from very remote periods of antiquity, yet the great monumental builders of Egypt and Greece, although quite familiar with it, wisely avoided its use in their more important structures, knowing well the destructive nature of this most mischievous and absurd of building contrivances. Mr. Fergusson tells us that the Hindoos say "the arch never sleeps;" and although the Mahomedans of India use it frequently, the Hindoos avoid it altogether. Every one knows what wonderful results may be produced by the hammer and the wedge; and yet, strange as it may appear, these two powerful agents are brought into active and violent antagonism in this much-lauded principle of construction. The arch is composed entirely of wedges, and every stone that is laid over these acts with the force of a hammer to drive the wedge home, and, if possible, to rend asunder the walls into which they are introduced. One false step generally involves a whole series of evasions, palliations, and subterfuges, and so the arch builders were driven to the necessity of calling to their aid the auxiliary and supplementary powers of the abutment, buttress, and counterpoise, and by these means the destructive energies of the two opposing forces may be practically restrained for a time; and, if ordinary care be taken to prevent waste and to make such repairs as may from time to time become necessary, it is wonderful to note how long the deadly struggle may be protracted, especially if the openings are not very large or very numerous, and the walls very lofty. But if such care is not taken, there are other powers ready to step in and take part in the strife. If the joints are not kept well stopped the rain will get in, and frost following will cause the wet mortar to swell, and so test the restraining forces to their very utmost. Then there is the vibration caused by storms of wind, and even such slight influences as the rumble of passing vehicles; and, as sure as there is the minutest yielding to any of these forces, so surely will the ever-vigilant hammer drive home the wedge and secure the advantage gained. This is, you will observe, a very slow process, and as it goes on year by year, it is very little noticed; yet in a good many years it begins to tell visibly, and by-and-by, if the process be allowed to take its natural course, the whole thing comes to the ground; and so from these various causes the adoption of the arch by the Romans

has strewed Europe with ruins. There are, doubtless, many instances in which, by great power of opposing thrust, or enormous weight of counterpoise, arched structures built by the Romans are still standing; but, unless where there are natural abutments such as in bridges jammed between the jaws of rocky chasms, the amount of material employed in the restraining forces is out of all proportion to the results, whereas lintelled buildings in Egypt and Greece, unless where shaken by the irresistible power of earthquakes, or the deliberate efforts of human violence, have stood for thousands of years without showing any other symptoms of decay than such as have resulted from the ordinary process of disintegration. We are told that we ought to use the arch because it is so very scientific, and that the lintel ought to be despised and rejected because it is so very rude; but we see that our best engineers are adopting the girder instead of the arch for wide openings. They find that to put a simple string to the bow of an arch is much easier and more economical than any such clumsy main-force contrivance as abutments, buttresses, and counterpoises; and, carrying out the principle a little farther, it is found that the two elements of hardness and tenacity while brought into opposition may at the same time be brought into perfect subordination, so that we may say that they have been put to sleep. In this way Stephenson laid a lintel over the opening formed by the sea between Caersarvon and the island of Anglesea, which is considerably greater than any opening ever spanned by an arch. Now, you will observe that the simple, unsophisticated lintel contains in its structure all the scientific appliances of strutting and straining used in the great tubular bridge. It has within itself the principles of the bow and string, the elements of hardness and tenacity in perfect repose, and when laid upon two jamps there is no reason why it should ever stir. We may admire a thing that is difficult to do, but the merest common sense and the highest wisdom alike recommend us to use what is easiest and best, instead of what is difficult and dangerous. In short, Stonehenge is more scientifically constructed than York Minster.

Before leaving this part of our subject, I may notice a form of the arch which has generally been regarded as the first rude stage of its development; but on more particular inquiry into the matter, there will be found reason to doubt the absolute correctness of such a conclusion. As I have already said, the radiating arch is properly a bricklayer's contrivance: the other form, or corbelled arch, is found in masonry. It is formed by projecting each successive course of stone more or less over the course below, until they meet at the top. This is sometimes done by straight sloping sides, sometimes by curved sides forming a pointed arch. But Mr. Fergusson gives a curious example found in the temple of Der-el-Bahri, in Thebes, where a semicircular arch is formed on this principle; and one more curious at Assos, where there is a pointed arched recess on one side of a wall and a semicircular one on the other, both constructed on this principle, while between there is a doorway covered with a lintel. There are also examples where a lintel is introduced at a convenient height, and over it a saving-arch on the corbelled principle. On the whole, therefore, there is good reason to believe that whether or not the corbelled arch preceded the radiating arch in point of time, there seems little doubt but that it was continued in use contemporaneously with the latter, under the well-founded belief that the horizontal courses of the corbelled arch had less tendency to push out the walls on either side than have the wedge-shaped stones of the radiating arch. There is a yet simpler form of arch, which consists of two stones laid sloping against each other. In this form the lateral thrust must be very considerable, but of course it will be greater or less according as the angle at which the stones lie to each other is more or less acute.

So much for the arch as a structural contrivance. We will now consider its merits as an architectural feature. As I have already noticed, the introduction of the arch into architecture produced a radical change. We cannot tell when it began to be so used, or who was the first to do it. The earliest examples we know are to be found in the remains of the palaces of Assyria. But while it appears from this that the Romans were not the first to use the arch in this way, there can be no doubt that upon them lies the credit or blame of bringing it into general use. And with the arch although quite independent



of it, came what is called fenestrated or windowed architecture, which led to an entire revolution in the art, and brought into active operation those principles upon which mediæval and modern architecture are chiefly based. It will be remembered that in the lecture on Greek architecture I drew attention to the three windows between the columns of the semi-attached portico of the Erechtheon, and stated that these had served as models for us in nearly every street-house that has been built in Glasgow during the last sixty or seventy years. As we know very little about the domestic or other secular buildings of the Greeks, we cannot tell to what extent they used the window as an architectural feature. Certainly this group does not appear to be a first attempt; but we are inclined to think that the Romans deserve the credit of fully adopting fenestration as an architectural principle as distinguished from the columnar, which had been growing all through the early ages of the world down to its perfect development on the Acropolis of Athens. The great importance of the change will at once appear when it is pointed out to you that from henceforth the attention of the architect was to be directed to the voids instead of the solid parts of his structures. Let us consider, then, the relative capabilities of these two very opposite principles. Windows may be either lin'elled or arched. In the meantime we will confine our remarks to the latter. Consider on the one hand the column and all the fine wisdom that it is capable of containing, the composition of its various parts, its admirable proportions, the extreme delicacy of its outlines, and its perfect harmony with the surrounding parts of the structure. It may be made as beautiful as the imagination of man can conceive, or as his wisdom can execute—a form of ideal perfection. On the other hand, look at the arched void. It is, to begin with, a hole in a wall, and what can you make of it? First then, as to proportion. A very good proportion is two diameters for the height; but there is no proportion that can be said to be the very best. In this respect it is quite vague, or, as its admirers say, free; and freedom is a very useful quality where nothing is particularly aimed at. But it is quite clear that a form which cannot be made excellent does not belong to the highest style of art. A semicircular arch, starting from a horizontal line, is quite a satisfactory form in its way, but it is not susceptible of any very delicate treatment. But a semicircular arch springing from simple perpendicular jambs is what no educated eye can endure. The junction of the perpendicular lines with the curve seems intolerably feeble and unsteady. Many a scheme has been tried to correct the fault; some have been more successful than others, but none of them, as far as I am aware, have been quite satisfactory. The first resort is the introduction of an impost-band or moulding, but this makes two emphasised points at the shoulders of the arch, and the eye wanders restlessly from the one to the other; moreover, these belong properly to the piers, which immediately become too powerful for the arched head. To restore the due preponderance of the arch, and to provide a third point which shall afford some degree of rest for the eye, a key-stone is added—at best an extremely clumsy excrescence. This combining with the projections of the impost in forming a group which appears now in connection with the arched head, the attention is arrested by it, and the jambs which formerly overpowered the arch have become unduly subordinate. Besides this simple way of treating the arch, there are a great many ways of dressing it,—by surrounding it with mouldings, rustic channels, and the like, which to some extent serve to divert the attention from the original defect; but the practised eye sees through all these evasions, and refuses to admit the arched opening amongst the ideal forms. And so the fidgetty restlessness goes on, shifting from one thing to another, but leading to no high end or soul-satisfying result. If we look at a square-headed window, we will see that few of the objections which are observed in the arch are applicable to it. At the very first sight, we find that the two jambs and lintel, being a triad, form a kind of harmonious combination, such as the eye can look at without much discomfort. If the top be found a little too powerful, a slight inclination of the jambs inward will correct this, and an opening about twice and a quarter as high as it is wide will be found a comparatively satisfactory shape without any supplementary or decorative feature whatever. But there are also several forms of dressing with

architraves which admit of the nicest adjustment of proportion, the finest combination of lines, and the most delicate ornamentation. A window with architrave, frieze, cornice, and trusses may exercise the talent and test to the utmost the skill of the most highly gifted in the architectural profession. Any such attempt to refine upon the form and dressings of an arched window would be quite out of keeping with the bold, strongly-pronounced character which is peculiar to it. But, in spite of all refinements, there is one thing which places the window in a position of inferiority to the column, that is the fact that, being a void, there is no object or medium on which the eye can rest while the mind is sending forth its feelers on every side, in order that, by an intense and all-absorbing effort, it may comprehend the various thoughts or qualities presented to it into one perfectly-embodied idea.

(To be continued.)

## Civil Engineering.

**EAST NORFOLK RAILWAY.**—On Tuesday week the East Norfolk Railway, from Norwich to North Walsham, which has been some time in hand, was at last opened for traffic. There are stations at Whitingham Junction (where the line leaves the Norwich and Yarmouth line of the Great Eastern system), Salhouse, Wroxham, Greatstead, and North Walsham. The line was constructed by Messrs. Lucas Brothers.

**ENGINEERING IN PERU.**—The Pacasmayo railroad has just been finished from the Pacific to La Vina, a distance of seventy-five miles. The eastern termination is 3,469ft. above the ocean. Leaving Pacasmayo at 8 a.m., one can now reach Cajamarca (the famous city of the Incas) at 8 p.m. The most wonderful part of the road is the great iron mole, which is to extend 2,190ft. into the ocean. There will be 146 bays, each 15ft.; 101 are completed. There is to be a head over 90ft. wide by 300ft. long. The bottom of the Pacific here is mingled sandstone, conglomerate, and limestone, so hard that three tons on the top of the iron pile, with steel-pointed drill, makes very little headway. The tide rises 4ft., and the prevailing wind is S.W. Mr. Meiggs builds the road for 7,000,000 dols.

**PORTGORDON HARBOUR.**—The Duke of Richmond has nearly finished the formation of a new harbour at Portgordon, N.B. The works, which comprise 1,400ft. of berthing quayage, inclose a basin with an area of about three imperial acres, and afford accommodation and protection for 250 large fishing boats. The east quay runs straight from the beach into the sea, a distance of 400ft. In this part of the works the walls are constructed of blocks of freestone, the packing being gravel and stones. At a distance of 41ft. west of the east quay, and parallel to it, is the new east pier, which is 260ft. long and 28ft. wide. On the west side there is a pier stretching from the shore in a direct line north or seaward a distance of 250ft.; then turning to the north-east, it extends a further distance of 175ft. From that point there diverge two breakwaters, the outer breakwater running on the same line with the outer cant of the pier, a distance of 250ft., and the inner breakwater running directly east a distance of 210ft. The outer breakwater terminates 40ft. from the end of the east quay. The west pier, throughout its whole length of 425ft., has a width of 28ft., and a parapet wall 5ft. high, and is formed of concrete walls filled in with gravel and stones. The whole of the piers and the breakwaters have a height of 19ft. above the foundations. The harbour will cost £15,000.

**RAILWAYS AND ROADS IN NEW ZEALAND.**—From the statement of the Minister for Public Works of New Zealand, we learn that in that colony 1,010 miles of railway have been authorised, for which £5,575,400 has been appropriated, and that up to the present time £3,660,881 has been expended or pledged out of this appropriation, with the following result:—Ninety miles of railway open for traffic, 58 miles of railway complete and ready for traffic, 103 miles of railway on which the platelaying is going on, and 421 miles of railway under contract and in course of completion; so that in little more than 12 months we may expect to have 672 miles of railway completed, at a cost of £3,660,881. The progress of road construction in the North Island is thus briefly summarised: "On the 30th of June, 1874, there were 1,188 miles of dray-roads opened or in

progress, and a total length of horse-roads of 526 miles constructed, at a total expenditure, including all liabilities, of £425,149." These dray and horse-roads have, with slight exception, been carried through districts where three years ago there was scarcely a single European inhabitant; they give access to millions of acres of rich country and magnificent forests wholly inaccessible before, and it is found that even the fragmentary portions of railways as they are opened in the various provinces pay more than working expenses from the moment traffic commences.

**SAVING MASONRY IN THE PIERS OF ARCHED BRIDGES.**—A paper, read by Mr. James B. Eades, C.E., before the American Society of Civil Engineers, contains the following suggestions for a method, where timber is abundant, of saving masonry in the piers of arched bridges, which may be employed where the bridge consists of two or more arches, by introducing wooden chords in them against the skewbacks or piers and abutments. These wooden chords would act in compression only, and form a series of compression members instead of a line of tension members or chords from abutment to abutment, as in the case of bowstring girders. They need not, however, be in compression unless the bridge is loaded. If there be a series of long spans together, however, the loading of an arch at one end of the series would produce compression throughout the entire line of chords in the other arches, and this might shorten those chords so much in the aggregate as possibly to allow the loaded arch to spread too much, and thus produce objectionable deflection in the roadway of that arch. In this case it would be desirable to make the abutments stronger and put an initial compressive strain in all of the chords of the system by means of screws or wedges against one end of each line of chord timbers. In a series, for instance, of five arches of 500ft. span each, where the maximum horizontal force of the load is 500 tons on the chords, if an initial compressive strain of 400 tons be produced in the entire system, from abutment to abutment, when the bridge is unloaded, then this initial strain will be taken out of the chords of the first arch so soon as it has its maximum load on it, while the compression in those of the unloaded ones will be only increased 100 tons, and therefore the shortening of those chords would only be one-fifth part as great as if they had no initial compression; hence the deflection by load on any one arch in the system would be reduced accordingly, and would be really less than what it would be in an ordinary bowstring girder. In this case, the maximum stress on the abutments, when all the arches are loaded, would be 500 tons load + 400 tons initial compression + (the force from unloaded arches, say) 300 tons, making a total of 1,200 tons; while the piers would be subjected to vertical pressure only, and hence they would be as cheap as if for ordinary girders. If the timbers were secured together to resist tension, of course the compressive strains would be so much lessened, and the abutments proportionately reduced in cost. With such a system of wooden chords used only in compression, the repairs of the timber would be very simple and easy. The sticks should be squared at each end and butted against each other throughout the span, vertical movement being prevented by the connections of the floor beams with the arch, and lateral movement by the wind-bracing of the floor. To remove any defective stick it would only be necessary to withdraw the wedge, or slack the screw at the end of the line in which it was located, and by which the initial compression was created, and every piece in that line would then be released and any one easily removed. The initial compression could be so great that no tension could be produced in either chord by wind pressure, and hence no jointing of the sticks together would be necessary to resist wind. The track stringers and every longitudinal timber in the floor-way could be thus utilised to resist the thrust of the arches, and in this way, where timber is cheap, a very durable and economic structure can be erected. As no thrust in such a bridge can come on anything but the abutments, and as these can generally be located on the high banks of the stream, the cost of the entire substructure would exceed very slightly that which would be required in a truss bridge with spans of equal length. It would probably be best to make the arches of such a series uniform. The thrust at the abutments will be the same whether there be but one or many arches in the system. The stress on the chords (except initial) would be due entirely to the unequal loading of the various



arches. This method is applicable to parallel truss bridges, and by it the iron lower chord or tension member may be omitted and wooden compression members substituted therefor. The objection to the combination of wood and iron in bridge construction, owing to the difficulty of repairing the bridge, does not exist in this method. In all others, the wood is either under tension or compression and therefore difficult to be removed. In this, the entire chords of any one arch could be removed without endangering the stability of that arch or of any other one of the series; for it is plain that if any temporary weight were placed on the floor beams, which would equal the weight of the chords to be removed, the equilibrium of the whole series would be undisturbed by their removal, so long as the whole bridge remained unloaded. In repairing it would never be necessary, however, to remove any one chord entire at once, but only to replace such pieces as were found defective.

**THE LITTLE ROCK BRIDGE CO.**—Funds are being raised in the City on behalf of the above Company for the construction of a new bridge across the Arkansas river at the city of Little Rock. An Act of Congress provides that the bridge shall be constructed in accordance with plans which have been submitted to and approved by the Secretary for War of the United States, under whose supervision the work of construction is placed. Mr. William Wilson, C.E., of 37, Great George-street, Westminster, will, on behalf of the bondholders, supervise the construction of the bridge. This bridge, 1,080ft. in length, will be the connecting-link between the railway system east of the Mississippi river, and that of the states and territories of the South-west.

#### THE TURNERS' COMPANY'S COMPETITION.

ON Monday the Lord Mayor distributed the prizes gained in the competition recently arranged by the Turners' Company, and referred to by us last week.

The LORD MAYOR, in opening the proceedings, said the ancient guilds in the City had been making some movement during the last few years in reference to improvements in their respective trades. But the Turners' Company had made considerable progress in the work, and he had seen some good specimens of work from one or two other companies. But, without wishing to disparage them, if some of the large companies—such as the Merchant Taylors, the Goldsmiths, and one or two others—if they were to put forth their strength, they would have some splendid works of art in this country, and something which would be of use to the community. Some of the companies, however, were more remarkable for their riches than anything else. These would do well to follow the example of the Turners' Company. The articles shown by this company were such as would do credit to any company, and were real specimens of art. They proved what could be done by skill and imagination when rightly applied; and exhibitions of taste of this character were—there could be no doubt about it—a mark of intelligence and civilisation. He urged upon the company to continue its utility and usefulness in this direction.

The MASTER of the COMPANY (Mr. Sadgrove) noticed that this was the fifth year the exhibition had been held and the prizes distributed in the Mansion House, and he hoped that succeeding Lord Mayors would continue the kindness and liberality of the present Lord Mayor and his predecessors. This year the operations of the company had been enlarged, and prizes had been offered for specimens in lapidary and brass-work.

Professor TENNANT, as one of the judges in the lapidary section of the exhibition, spoke of the general good quality of the specimens of this work shown. All the productions exhibited considerable ability. An old London-cut diamond was even now taken as the standard of perfection, and with a little perseverance the modern London-diamond-cutting might equal, if not surpass, the old.

Mr. W. VAZIE SIMONS, one of the judges in stonework, said that the fact that the exhibition was so small was rather the fault of the company, who issued their invitations out so late as to scarcely give workmen time to produce specimens of their skill.

Sir GILBERT SCOTT described the ingenuity and skill shown in several of the exhibits, and

pointed out their beauty of form, without which, he observed, workmanship went for nothing. Perfect specimens of art, as his Lordship had justly said, was a mark of civilisation, and this, then, only showed the high state of civilisation attained by the Greeks and Etruscans, whose specimens were unsurpassed at the present day—nations that they had now lost every word of their language, and scarcely knew when they lived.

After a few words from Mr. S. JACKSON upon the brass and gun-metal exhibits, his Lordship distributed the prizes as follows:—

#### LAPIDARY WORK.

Class A.—Ruby, Sapphire, Emerald, and Spinel. 1st Prize, Silver Medal and Freedom of the Company and of the City of London; Mr. Frederick Garrett, of 3, York Villas, Strand-green, Holloway, an apprentice, aged 19. (Freedom to be conferred when Mr. Garrett attains his majority.) 2nd Prize, Certificate of Merit and £2. 2s.: Mr. R. C. Nockold. 3rd Prize, Certificate of Merit and £2. 2s.: Mr. John Gorsuch.

Class B.—Topaz, Aquamarine, Crysolite, Jargoon, Amethyst, Rock Crystal, Garnet, and Peridot. 1st Prize, Bronze Medal and £2. 2s.: Mr. Alexander Wallace. 2nd Prize, Certificate of Merit: Mr. R. C. Nockold.

Class C.—Seal Stones, Cabochon Work of all kinds in regular and fancy shapes, including coral cut for mounting, carved Garnets, Onyx, &c. 1st Prize, Bronze Medal and £2. 2s.: Mr. Vincent Abertoldi. 2nd Prize, Certificate of Merit and £2. 2s.: Mr. Henry Giles Spencer.

Class D.—Diamonds (Brilliant and Roses). 1st Prize, Bronze Medal and £1. 1s.: Mr. J. D. Snook. 2nd Prize, Certificate of Merit and £1. 1s.: Mr. John Parsons. 3rd Prize, Certificate of Merit and £1. 1s.: Mr. Alexander Watt.

#### STONE WORK.

1st Prize, Silver Medal and Freedom of the Company and of the City of London: Mr. Frederick George Bradbury, of Penzance, for a vase in marble. 2nd Prize, Bronze Medal and £3. 3s.: Mr. Christopher Stone, of the Lizard Works, Cornwall, for a vase in Cornish marble. 3rd Prize, Certificate of Merit and £2. 2s.: Mr. John Nankervis, for two vases. 4th Prize, Certificate of Merit and £2. 2s.: Mr. James Macdonald, of Derby. 5th Prize, Certificate of Merit and £2. 2s.: Mr. Joseph Maw, of Derby, for an Etruscan vase. 6th Prize, Certificate of Merit and £1. 1s.: Mr. Edwin Pethick, of Poltescoe, for two vases. 7th Prize, Certificate of Merit and £1. 1s.: Mr. George Thomas Stephens, of 3, Lisle-street, Leicester-square, for three alabaster vases. 8th Prize, Certificate of Merit and £1. 1s.: Mr. John Edward Boden, of Matlock-Bath, for a chalice in flint spar.

#### BRASS AND GUN-METAL.

1st Prize, Silver Medal and Freedom of the Company and of the City of London: Mr. Thomas Rossiter, of Bristol, for a pair of tazzas. 2nd Prize, Bronze Medal: Mr. William Bickle, of Wandsworth, for a binocular microscope. 3rd Prize, Certificate of Merit and £2. 15s.: Mr. James Cohen, of No. 2, Bruges-terrace, Johnson-street, Stepney, for a watchstand. 4th Prize, Certificate of Merit: Mr. Thomas Bayley, of No. 10, St. Mark-street, West Birmingham, for a vase, matchstand, and candlestick.

#### SCHOOLS OF ART.

HANLEY.—The annual meeting of the pupils and supporters of the Hanley School of Art was held on Monday week. According to the report of the Committee, 1,405 works executed during the year were sent up to the Department. The Examiners affirm "The general merit of the works has advanced," and the following awards have been made to the most successful students:—Silver medal: Lewis Ellis, plaster design for panel. Bronze medals: Henry Saunders, design for water bottle; Arthur Davison, model of figure. Queen's prizes: J. Carr, model of ornament; Frederick Copeland, porcelain painting. Each year the Committee of Council on Education gives to the masters of Schools of Art throughout the United Kingdom prizes varying in amount from £10 to £50 according to merit, such merit being ascertained by a competitive examination of the entire works of such schools. The year before last in this competition, the Hanley school was placed fourteenth in order of merit, yielding a bonus of £20 to the master. In the last award made by the Committee of Council on Education Mr. Bradbury received a bonus of £40, and the school fills the third position on the list.

TUNBRIDGE.—The annual meeting of the Tunbridge Science and Art Classes was held on Tuesday week. The report stated that the morning classes had been well attended, but the evening classes had not been fully appreciated. There were 55 pupils in the model classes, and 39 in the industrial; 500 specimens had been sent up to South Kensington this year and

several prizes obtained, in addition to 14 pupils having passed and been awarded certificates. The classes, however, were in debt, and pecuniary aid would be most acceptable.

#### COMPETITIONS.

**THE MARGATE DRAINAGE COMPETITION.**—At the meeting of the Margate Town Council on Tuesday week, the competitive plans for the drainage of the borough were the subject of a long discussion. A letter was received from Mr. Lewis Angell ("Economy") in which he thanked the Council for having awarded him the first premium, and said he would proceed with the alterations in his plans forthwith, and would then submit the plans to the Local Government Board. The Mayor moved that Mr. Angell should be requested to send the plans to the Council, so that they might send them to the Local Government Board. Alderman Pickering said he believed the proceedings of the last meeting were illegal. Messrs. Gotto and Beasley ("C.E.") wrote to the Council protesting against the first premium being awarded to "Economy," after they had been invited to amend their plan in accordance with Sir J. Bazalgette's recommendations, and pointing out that "Economy" had not complied with the sixth condition of the competition, that each competitor must satisfy the Council that the work can be done for the amount stated on the estimate; nor with the seventh condition, that selected plans, before being premiated, must pass the Local Government Board. They, therefore, urged upon the Council that if "Economy" was allowed to submit any amendment of his plan they were entitled to the same privilege. It was resolved that the plans should be returned to the Council instead of Mr. Angell sending them direct to the Local Government Board. Letters were read from Messrs. Russ and Minns ("Experience") and Mr. Eacchus ("Experientia"), in which the writers said that the Council, having failed to fulfil the conditions of the competition, had rendered themselves liable to pay for the time and money expended by the competitors in preparing their plans. Ultimately it was decided that the Mayor be requested to convene a special meeting to consider the position of the Council in relation to the several competitors for the drainage of the town.

#### CHIPS.

Two of Constantine's patent convoluted stoves have been fitted in the new Manchester Royal Exchange, with the most satisfactory results. The stoves weigh about 4½ tons each, and the radiating surface of each is over 400 superficial feet, the grate space being less than 4ft.

The inauguration of the Archæological Institute of Liège, and the installation in the palace of the Prince-Bishops of the collections belonging to the Institute, took place on the 12th instant.

Mr. W. J. Hall, architect, Raven Chambers, St. Helen's, has been appointed architect and surveyor of buildings to the Rainford Local Board. There was a large number of candidates for the office.

A new organ has been erected in the Bolton Town Hall, at a cost of £4,000.

A recent test of the relative strength of oak and Oregon pine, made at San Francisco, with bars each 1in. square and 3ft. long, showed that the pine was equal to the oak. Both broke under the same weight placed in the middle of each bar, namely 260lb.

The annual (free) exhibition of Students' works, executed within the last 12 months, will be held to-day and to-morrow at the Female School of Art, 43, Queen-square, between the hours of 10 and 4.

James Wood, late Board Surveyor to the Pontefract Town Council, is "wanted" on a charge of fraud and embezzlement.

Mr. James Herbert Wisby, of the firm of Stuart-Barker, Son, and Wisby, auctioneers, of the City and Walworth-road, and a member of the Lambeth Vestry, died on Wednesday last in his thirtieth year.

The German archæologists commissioned to conduct the proposed excavation at Olympia at the expense of the German Government, arrived at Athens on the 14th instant, and were to begin their labours before the expiration of the present month.

The Balith Board of Guardians are about to erect a workhouse for sixty persons. The cost of the site is £850, and the estimated cost of the building is £3,650.

The Doncaster Town Council have succeeded in obtaining an increased rental for their sewage farm. They used to get £310 per annum, and now receive £800, Doncaster, at any rate, finds irrigation profitable.



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## OUR LITHOGRAPHIC ILLUSTRATIONS.

## GROCERS' MIDDLE-CLASS SCHOOL COMPETITION.

FOR years past, as our readers know, we have from time to time given reproductions of unsuccessful competition designs. We have done so because certain unsuccessful designs are better than many of the successful ones. We have given more than usual of the Grocers' Middle-Class School unsuccessful designs for two reasons—first, because, as compositions, they have been, in our opinion, worthy of publication, and a dozen times better than many of the executed works we see about us; and secondly, because “the authorities” who directed that competition were determined to treat it as a sealed letter. It was private, and private they were determined to keep it! But it so happens there has been more said about this competition than there otherwise would be, on account of the misdirected energy and zeal that were expended to keep it strictly and sacredly private. This week we give three of the designs, as submitted by Mr. Thomas Harris, Mr. Roger Smith, and Messrs. Giles and Gane.

## MR. THOMAS HARRIS'S DESIGN.

In this design, an elevation of which we give, with plan, the author has proposed the lecture-theatre to serve also the purpose of a dining-hall. The fall of the ground has been taken advantage of by forming an arcaded basement under the classrooms as a playground. The upper three stories have been appropriated to the classrooms, and these are approached from the boys' entrance through the hat and coat-room. North lighting is obtained for the classrooms. Fifteen classrooms are provided, each 13ft. in height, and are separated from each other by solid walls. In the seating the author has adopted the complete isolation of each scholar, and the desk known as Colman and Glendinning's “Collegiate School Desk.” The avenues are transversely placed, not in the direction of the room, so that five, instead of three, rows deep may be obtained. Lavatories are placed in the rear of the staircase on the ground and first floors. The kitchen and other offices are located under the dining-hall, which latter is on the highest level to the east, and has a distinct entrance. The materials proposed were hard stock bricks for walls, with facings of red bricks, and Bath stone dressings. The author is Mr. Thomas Harris, architect, Holborn, and the estimate, cubed at 6d. per foot, came out under £12,000. The references to plan we subjoin:—

- |                                     |   |
|-------------------------------------|---|
| 1. Entrance-hall                    | 12. Secretary's room                            |
| 2. Steps from entrance              | 13. Under-master's room                         |
| 3. Waiting-room                     | 14. Head-master's room                          |
| 4. Lecture theatre and dining-hall  | 15. Head-master's and secretary's lavatory, &c. |
| 5. Stairs to gallery                | 16. Strong closet                               |
| 6. Service and retiring-room        | 17. Under-master's lavatory, &c.                |
| 7. Servants' stairs                 | 18. Boys' stairs                                |
| 8. Matron's room                    | 19. Boys' corridor                              |
| 9. Smoke shaft and ventilating flue | 20. Classrooms                                  |
| 10. Lifts                           | 21. Boys' lavatory, &c.                         |
| 11. Private corridor                |   |

## MESSRS. GILES AND GANE'S DESIGN.

Messrs. Giles and Gane's design was submitted under the motto of “Pro Re Nata.” It was proposed to be built of stock bricks, with Farleigh Down Red Bed stone for all dressings. The ground-floor was designed for art and science classrooms, masters' and secretary's rooms, and large vestibules. The first and second floors would have been devoted to classrooms alone, the kitchens and other offices being at the back. The estimated cost was £11,863. The authors of the

design were Messrs. Giles and Gane, of 7, Farnival's Inn, E.C.

## T. ROGER SMITH'S DESIGN—“CLASSROOM.”

In this design there is much ingenuity and good grouping displayed. The arrangement is compact, and in strict conformity to the Prussian classroom system. On the ground floor we have a spacious entrance-hall, with right and left cloakrooms. Central with the entrance is a hall for 800, 67ft. 6in. by 36ft., lighted mainly on one side by large semicircular windows shown in our view. The extreme wings are occupied as rooms for the head and assistant masters, and on the other side is a dining-hall extending the full depth, being 63ft. by 22ft. 6in. The stairs on each side of the hall have two flights, and lead to the classrooms and lecture-hall. The seats are on the dual system, four and five deep; the larger classrooms are for fifty and the small for forty pupils. A gallery corridor on the first floor, overlooking hall, is an essential feature of Mr. Smith's plan. Exteriorly, the design is appropriate and simple in character. The staircases are developed into the campanile terminations, and the treatment of the windows with the horizontal masses is both simple and effective.

## CONGREGATIONAL CHURCH, CAMBRIDGE.

The object aimed at in this design was to put the whole congregation in sight and hearing of the service; and to do this without having recourse to thin columns and flimsy construction. The narrowness of the site prevented the adoption of any plan involving either transepts or a large central area; and to gain the required accommodation, it was found necessary to build up almost to the extreme boundaries of the ground. Hence the nave shaped itself as an unbroken oblong, and it only remained to see how the roof could best be carried, and especially how the clerestory (which, from the nature of the surrounding buildings, was almost a necessity for the proper lighting of the interior) could be supported with least detriment to sight and sound. Under these special circumstances it was determined to try the experiment of a nave-arcade in two bays, with arches of unusual span. The sittings are so arranged that the obstruction from one nave-pier only affects the alley or passage between the seats; while that from the other is inconsiderable. A secondary object in the design was to turn to the best account the tower, which, by the wish of the Committee, had to form one of the external features. By making it open into the end of the nave, and filling it with a deep gallery supported on a stone arcade, it was made to contribute about 130 towards the total of 700 sittings. For acoustic purposes, and to shut out extremes of cold and heat, the nave has an inner wooden ceiling, of a lower pitch than the roof. The apse-ceiling is also of wood, of a curved form divided into panels, which were intended to receive a series of subjects suggested by the 148th Psalm. The inscription round the base of this ceiling is from I. Chronicles, 29th chap., 11th v., and is executed in Rust's mosaic. The rest of the coloured decoration is still incomplete. The existing pulpit and Communion-table were not designed by the architect. The stained glass in the apse windows, comprising single figures and small groups from Scripture history, was the work of Mr. Leach, of Cambridge. The church is built externally of Yorkshire parpoint and Ancaster stone; the nave piers are of Darley Dale stone, and the walls are lined throughout with Bath stone ashlar. There is a carefully-studied system of ventilation, worked by a gas-stove and perforated air-trunks. The builder was Mr. Hors-

man, of Wolverhampton; the foreman was Mr. Hopcroft; the principal part of the carving was by Mr. Earp, and Mr. James Cubitt was the architect.

## MANCHESTER ROYAL EXCHANGE.

THE second stage in the erection of the Royal Exchange having been completed, the great central area was on the 19th instant thrown open for the accommodation of the subscribers. At least six months must elapse before the tower at the angle in St. Ann's-square can be finished, and there is a great amount of work to be done in many other portions of the building, but all that remains for the builder to do is subsidiary to the main object.

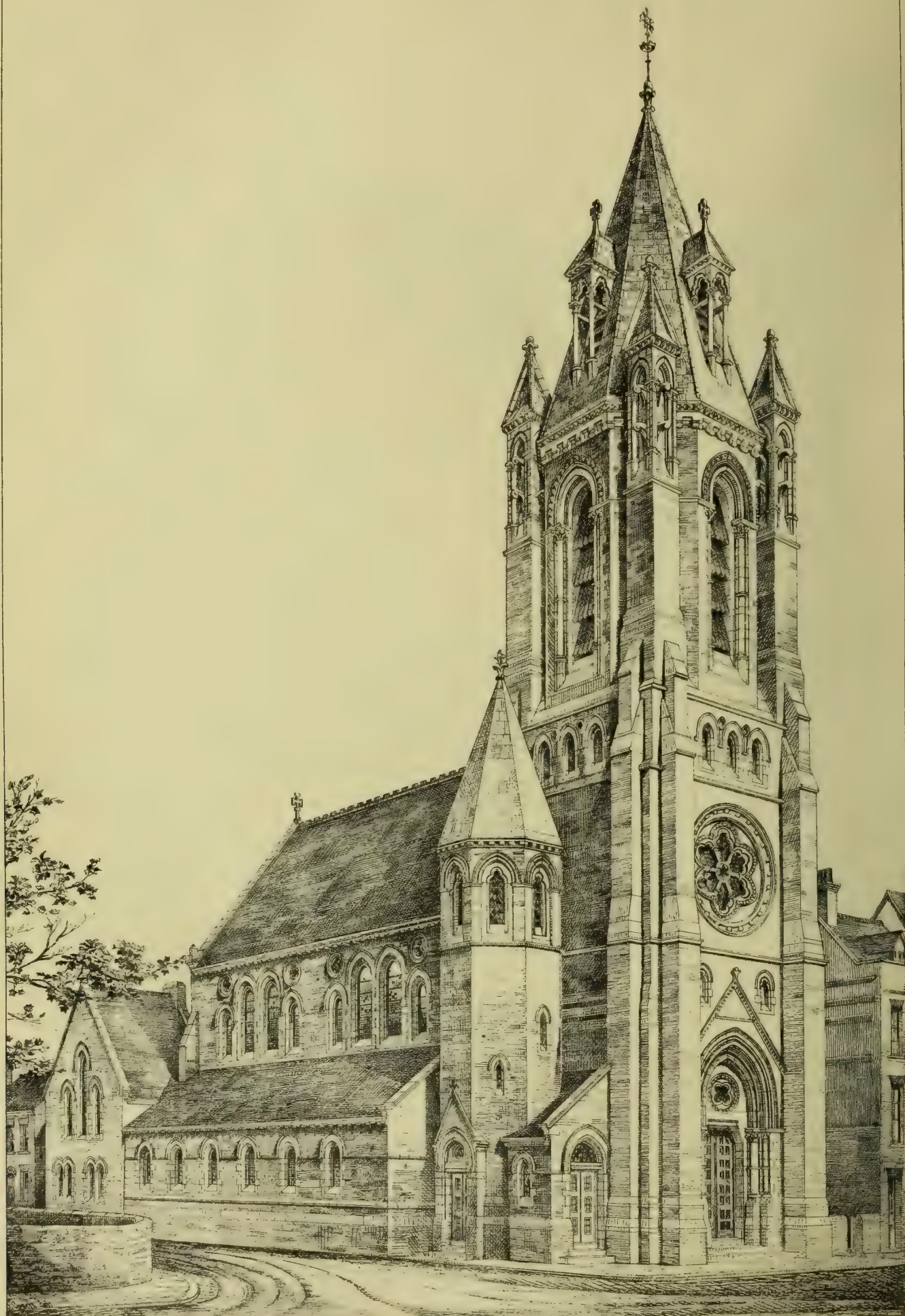
The first Exchange, which was erected on the site between Market-street and Exchange-street, in 1806, was repeatedly enlarged, and especially in 1856. The large room, however, was soon found to be quite inadequate, and the proprietors obtained, eight years ago, the Act under which they have erected the present building. The room which was completed in 1856 measured 185ft by 82ft.; the dimensions of the present room are 215ft. by 194ft. The area of the Exchange itself is 4,050 superficial yards; the central area is 96ft. between the piers, and there are double rows of aisles on the sides towards Market and Bank-streets, and a single aisle on the Exchange-street side. The central area is surmounted by a large hemispherical dome, 62ft. in diameter, and by two smaller segmental domes, the height from the floor to the “eye” of the central dome being 120ft. The aisles are of less height, and above them are ranges of offices. The architectural arrangement of the large room consists of ranges of arches springing from pier to pier, separated on the side next the central area by columns of red Irish marble, 3ft. 2in. diameter and 33ft. high, and standing on grey marble plinths 5ft. high; the large pilasters are cased with red and grey marble, from the quarries of Messrs. Sibthorpe and Son, of Dublin. Above the entablature is a clerestory, the arches of which are carried on shafts of terra-cotta. The most conspicuous portion of the building externally is the tower, which is now in course of erection at the Victoria-street corner. This will be carried to the height of 188½ft. The portion yet to be erected is circular in plan, with eight pilasters and open spaces between, and it will be crowned by a metal roof, with finials. In addition to the numerous offices above and around the great hall, there is a reading-gallery, 120ft. long, on the Bank-street side; a magazine-room, 33ft. by 15ft.; rooms for the directors and the master; post and postal telegraph offices; strong rooms, lavatories, &c. The completion of the western section places fourteen new shops, making twenty-seven in all, at the disposal of the Company. The architects are Messrs. Mills and Murgatroyd, of Manchester; the general contractors are Messrs. Parker and Son, of Liverpool, who have themselves executed the masonry and brickwork; Mr. Southern, of Salford, is the contractor for the carpenter and joiner's work; Messrs. Jaffrey, of Manchester, are the contractors for the plumber and glazier's work, and the copper with which the dome and a large portion of the roof of the building are covered; the plastering and the general decoration of the hall have been executed by Mr. Harwood, of Manchester; and the sculpture by Mr. E. G. Papworth, of London. The clerk of the works is Mr. Grimes. The building is warmed by Constantine's convoluted stoves.

The reopening of the parish-church of Ashmore, Dorset, took place on the 20th instant. The old building was in a very dilapidated condition, and it has now been rebuilt, with the addition of a north aisle and vestry, from the designs of Mr. F. Edwards, of Exeter, architect. The church is in the Early Decorated style of architecture, and is built of flint and green sandstone, with facings of Hamhill stone outside and Bath stone within.









CONGREGATIONAL CHURCH, TRUMPINGTON STREET, CAMBRIDGE. M<sup>r</sup> JAMES CUBITT, ARCHT. 1. 2. FINSBURY PAVEMENT E.C.

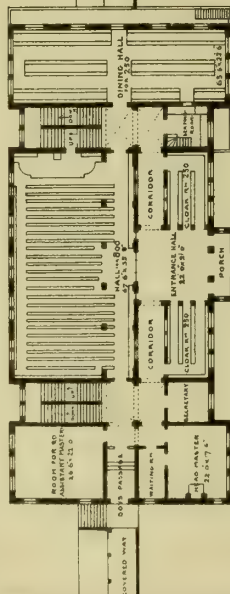




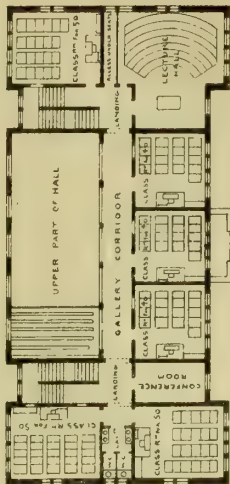


MIDDLE CLASS SCHOOLS HACKNEY FOR THE GROCERS COMPANY  
DESIGN BY T. ROGER SMITH, ARCHT.

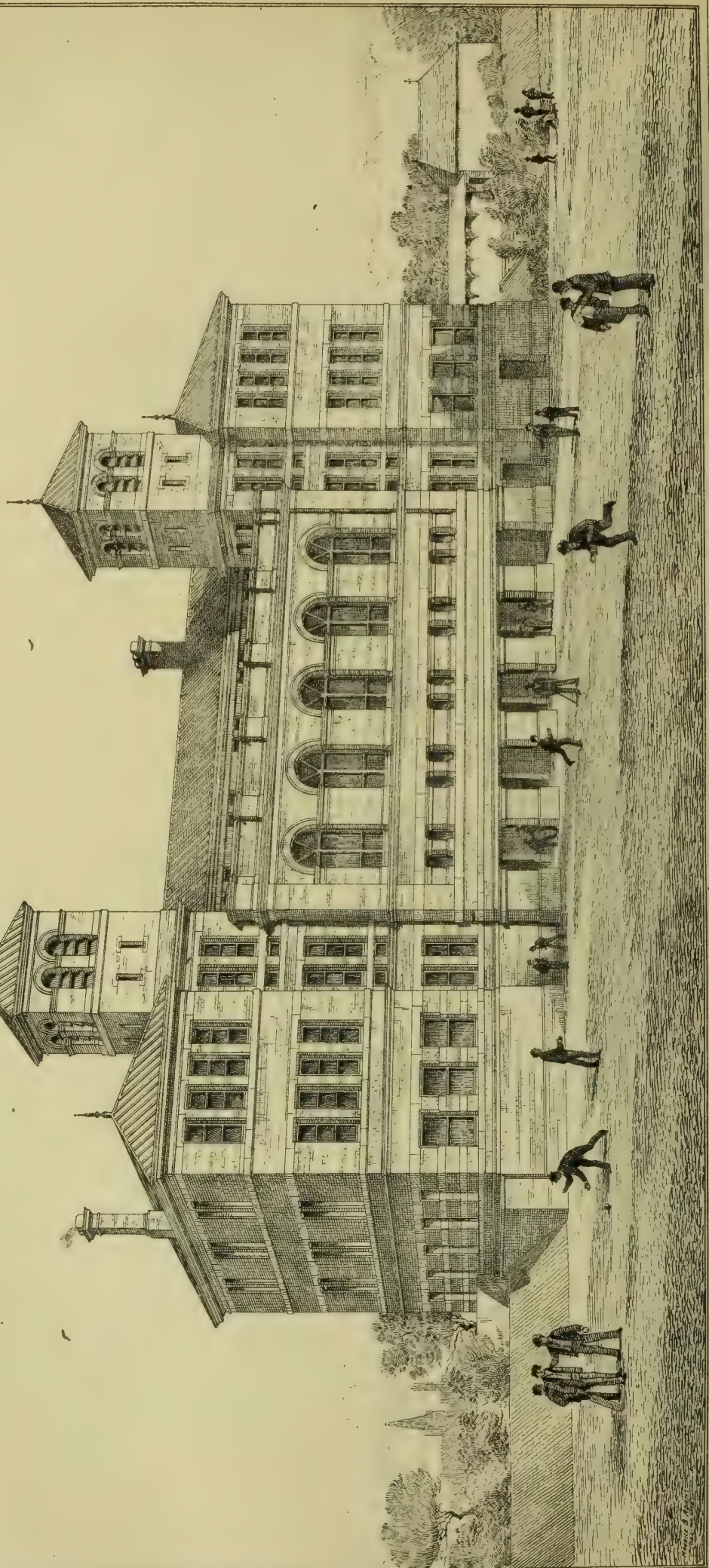
SCALE TO PLANS  
0 5 10 20 30 40 50 60 70 80 Feet



GROUND PLAN



FIRST FLOOR PLAN



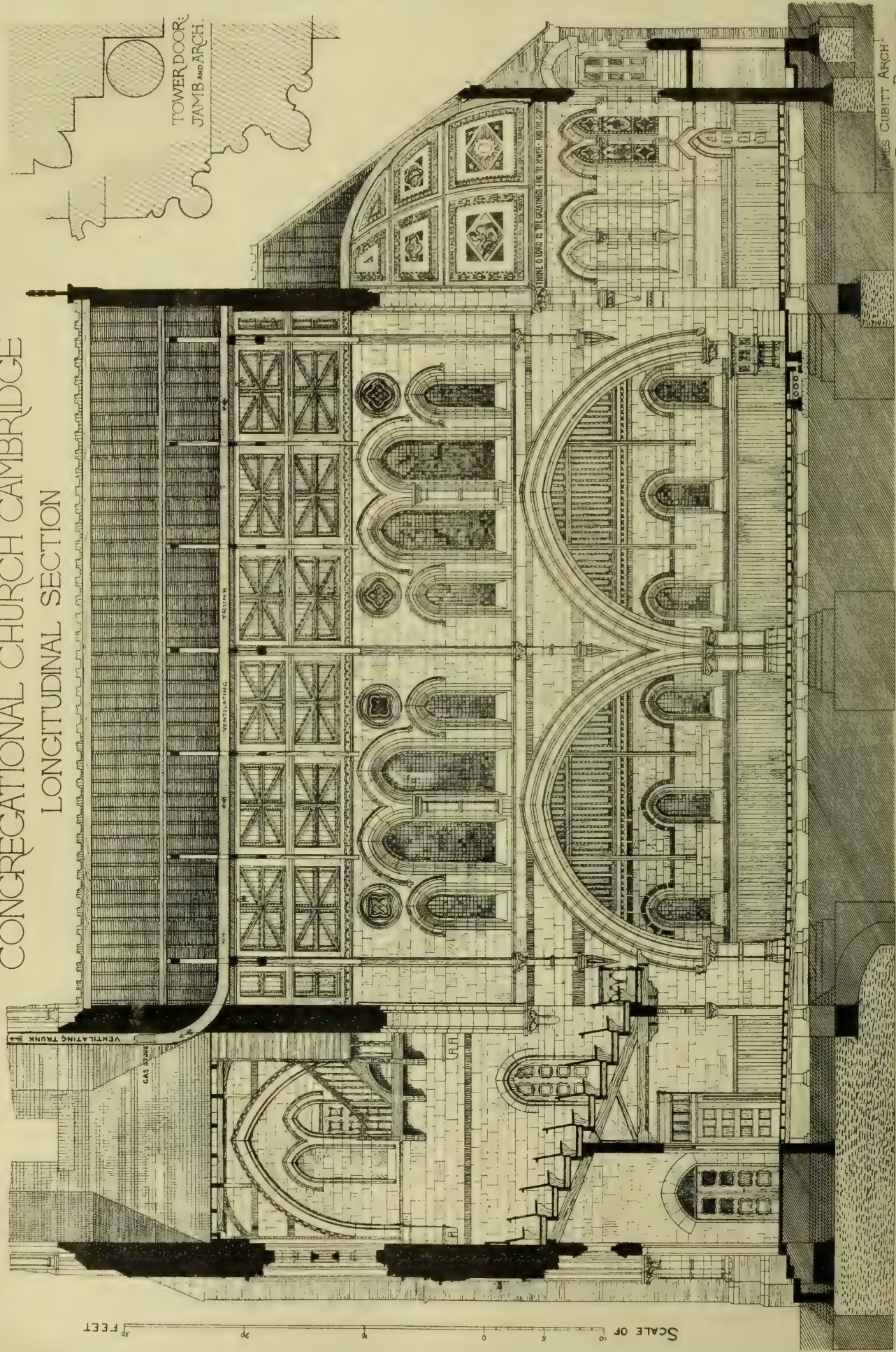






THE BUILDING NEWS OCT 30. 1874.

CONGREGATIONAL CHURCH CAMBRIDGE  
LONGITUDINAL SECTION



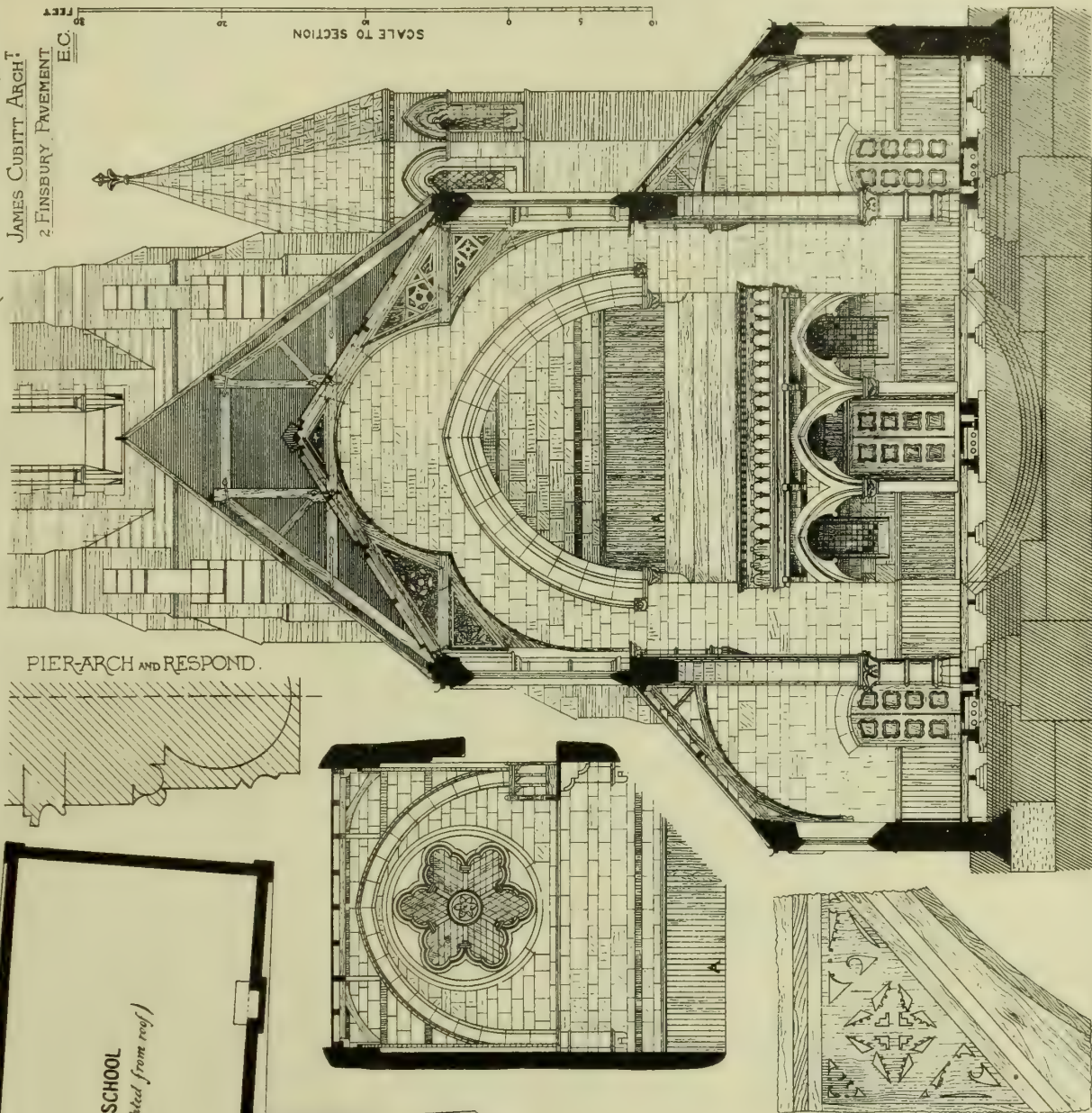
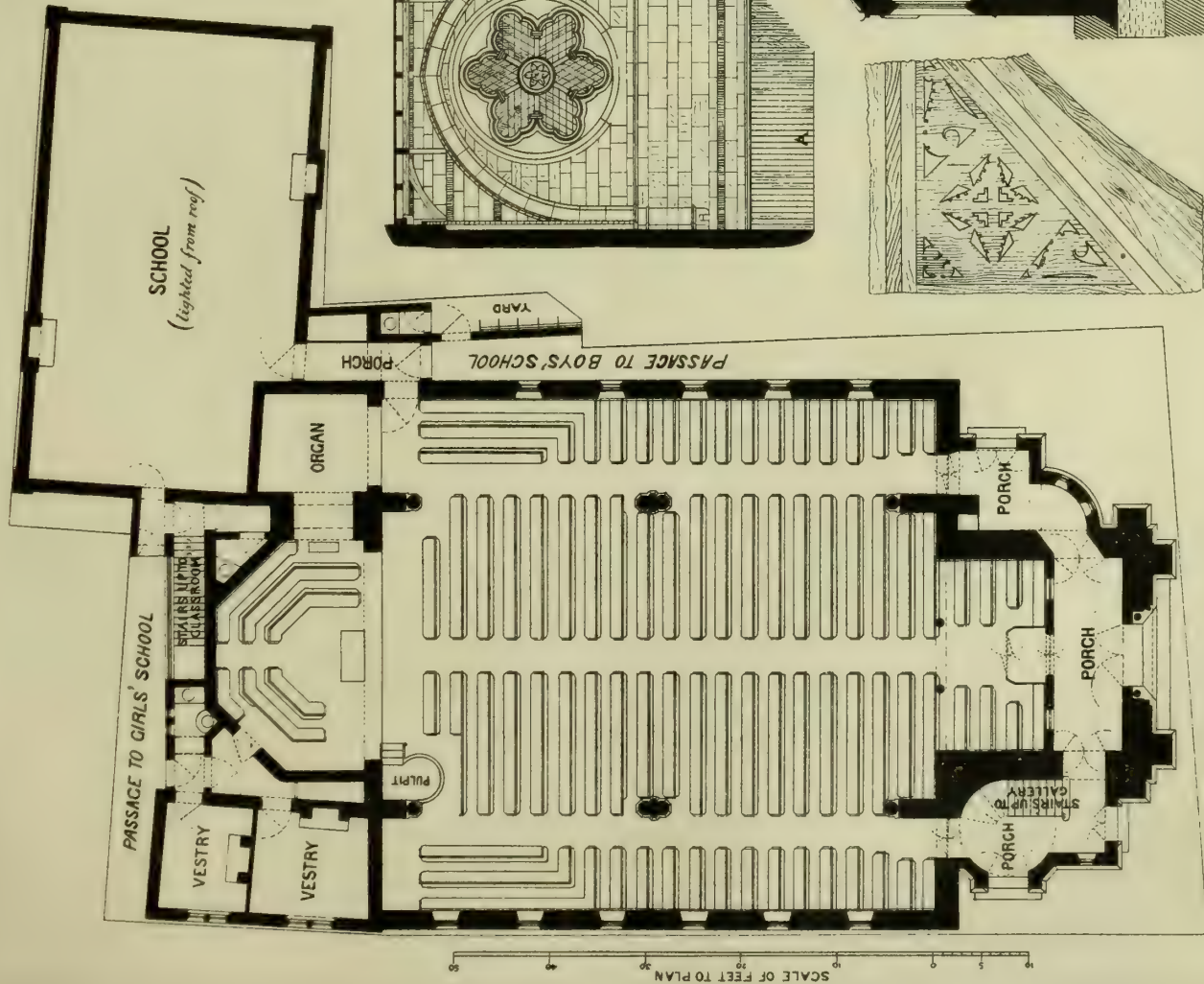
JAMES CUBITT ARCHT  
2 FINSBURY PAVEMENT EC

Drawn by James C. Cubitt & Son, 25, James Street, London, W.C.



# CONGREGATIONAL CHURCH CAMBRIDGE

JAMES CUBITT ARCHT.  
2 FINSBURY PAVEMENT  
E.C.

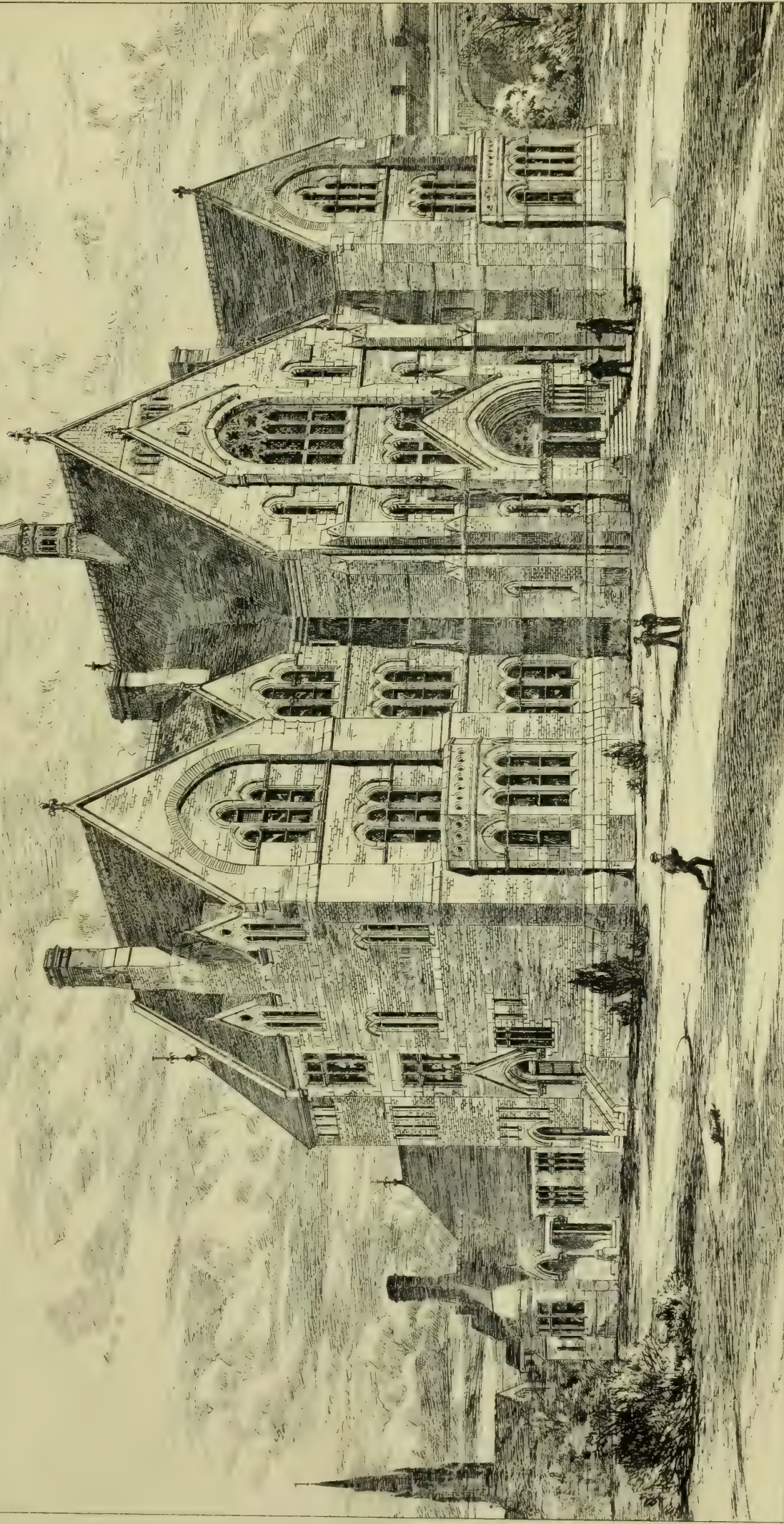








Middle: Clafs: Schools: for:  
the Grocers: Company: at:  
Design: submitted in: Competition: by  
Giles: & Crane: Architects:  
*Motto: Pro re uat* Furnivals Inn: F. C.





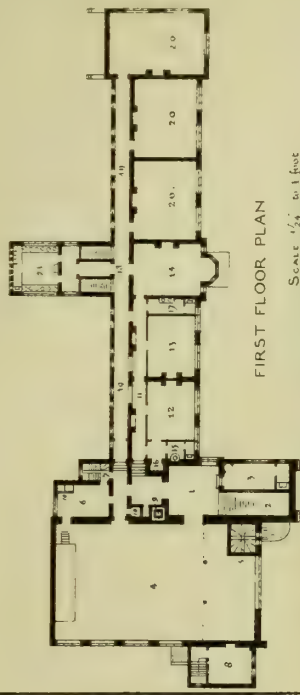




THE BUILDING NEWS OCT 30. 1874.

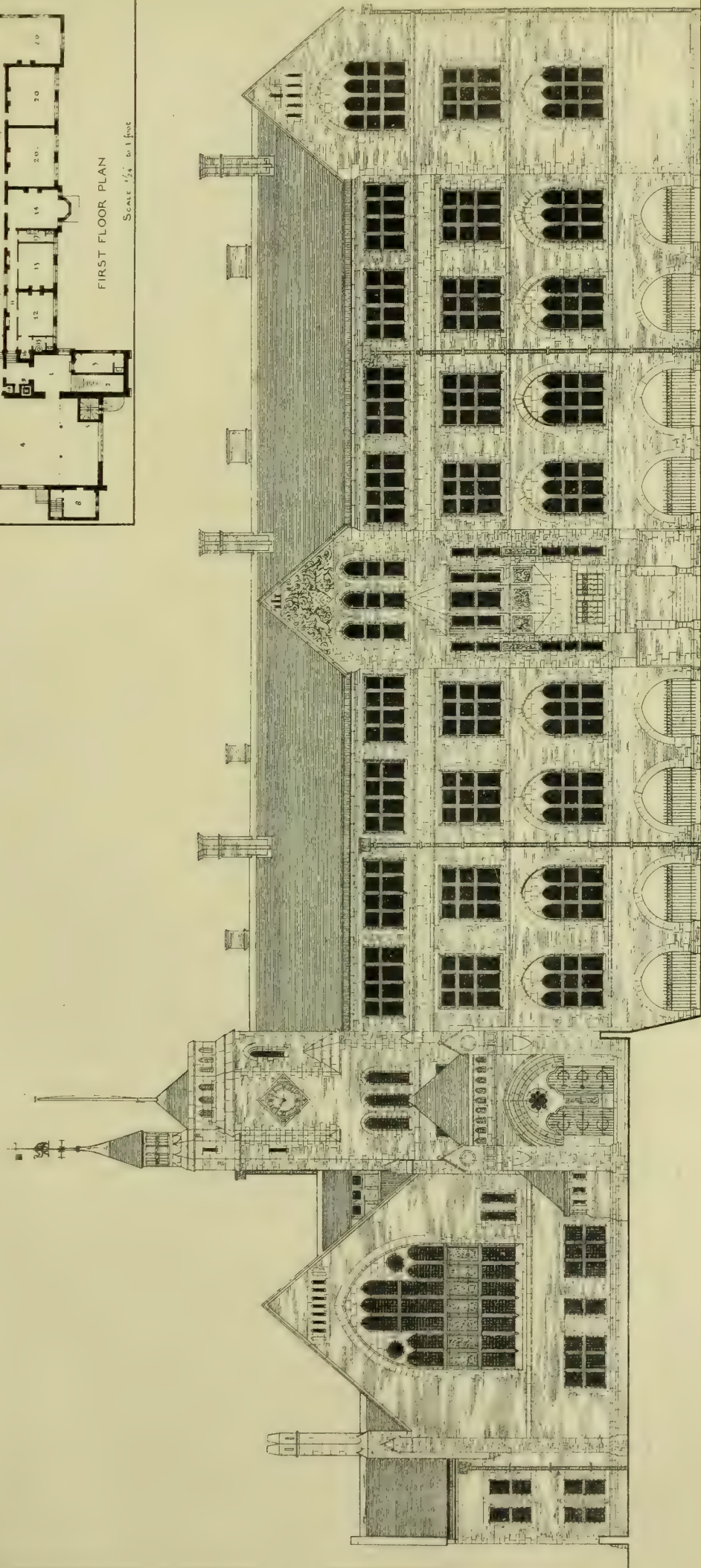
# MIDDLE-CLASS SCHOOLS-FOR-THE-GROCERS-COMPANY

COMPETITIVE DESIGN · BY · THOMAS · HARRIS · ARCHITECT · HOLBORN ·

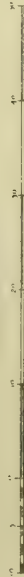


FIRST FLOOR PLAN

Scale 1/4" = 1 foot



SCALE OF FEET



NORTH-ELEVATION

*Thomas Harris, Architect  
10, Abchurch Lane, London, E.C. 4.*





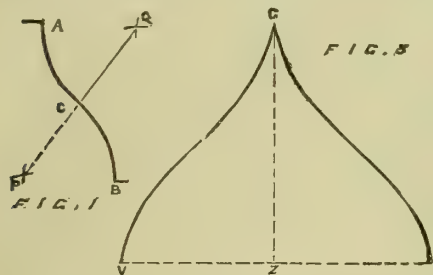


## CURVED LINES IN ARCHITECTURE.

(SECOND PAPER.)

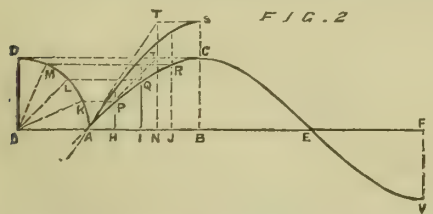
IN the former paper we considered the application of certain well-known curves to the purposes of architectural decoration, confining our attention to those lines in which the curvature is all in one direction, varying only in degree. We have now to examine a very different class of curved lines, namely those in which the curvature takes opposite directions at certain parts called points of contrary flexure, and generally known to the architect as the "ogee" or "cima."

The common mode of delineating such a curve when required for a moulding or an ogival arch is by drawing two arcs of circles turned in opposite directions, as AC and BC (Fig. 1), meeting at the point C upon the line



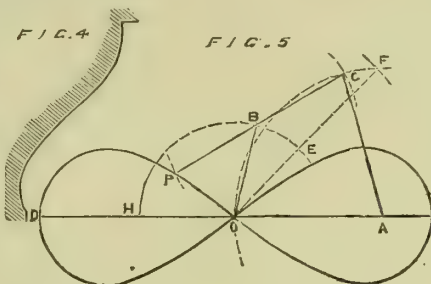
joining the centres P and Q from which they are struck. For small mouldings this method answers sufficiently well, but when a large moulding, or the contour of arch has to be drawn, the effect is disagreeable, from the uniformity of the curvature from A to C, or from B to C, and then the suddenness of the change at the point C, both of which are contrary to the principle of true mathematical lines, as in these the curvature always gets less and less towards the point of flexure, the radius of curvature increasing in length, and becoming infinite at the point itself; so that for a short distance on each side it is very nearly straight. Hence it will be seen that the form of Fig. 1 is not even an approximation to a true curve of flexure, as the curvature is as great on each side of the point C as at the points A and B.

Numerous curves of flexure are known to the mathematician, but few of them are adaptable to the wants of the architect; there are, however, two classes of this kind of curve which can be readily drawn and applied to architectural forms, which we shall now examine. The "harmonic curve" is one that can be drawn without much difficulty, and is capable of considerable variation in form. Take a horizontal axis, O, AB, EF (Fig. 2), and draw



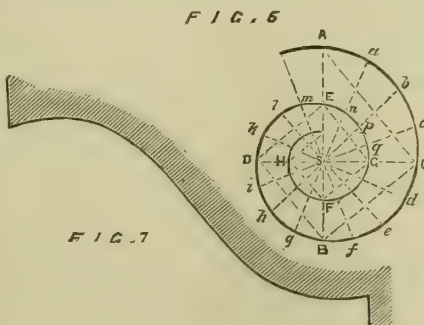
a circle with centre O and radius OA; make OD perpendicular to OA, and make AB equal to the length of the quadrant AD, AB being nearly eleven-sevenths of OA; make BE and EF each equal to BA. Divide the quadrant AD into any number of equal parts at K, L, M, and also the length AB into the same number of equal parts at H, I, J. Draw horizontal lines through the former points intersecting vertical lines from the latter points in P, Q, R, C, which will be upon the harmonic curve, and through them it can be sketched in by hand. The curve from C to E, and from E to V, will be an exact repetition of AC, and can be carried on *ad infinitum*. Any number of varieties of this curve can be obtained, as at AS, by measuring the ordinates HP, IQ, &c., on a different scale, or by lengthening or shortening them all in any given proportion. The

direction of the curve at the point of flexure A is best found by drawing the tangent TA, which is done by taking AN equal to AO, and drawing the ordinate NT equal to the total height BC or BS of the curve. The harmonic curve may be used by the architect to form the contour of an ogival arch, as shown at Fig. 3, where VC is one half an undulation, and corresponds to the part having the same letters in Fig. 2. But it is better adapted for the section of ogee mouldings as shown by Fig. 4, where rather more than half an undulation is used.



Another class of curves of contrary flexure is that known as the "lemniscate," resembling in form the figure  $\infty$ , the crossing of the curve being the point of contrary flexure. This curve can be drawn by continuous motion by means of a very simple apparatus; let AC and OB (Fig. 5) be two rods revolving about the fixed points A and O, to which is attached at its middle point B, another rod PBC, twice the length of OB, by pivots at B and C, so that it can move freely about those points. Let the rods coincide with the horizontal axis AOD, the point P being at D; then as they revolve from the horizontal position round O and A, a pencil at P will mark out the curve DPO, which is one-fourth of the whole lemniscate, each of the other quarters being exactly similar and equal to the first. The length OA must always exceed that of OB, and by altering its length we can get any varieties of the curve.

This curve can be also drawn by means of points found upon its perimeter in the following manner. From O as a centre, and with radius OB less than OD, describe a circle cutting the axis at H. Take OA greater than OB and from centre A with radius AO describe another circle, OCF. With O as a centre and radius OD, draw an arc cutting the second circle in F; and draw the straight line OEF cutting the first circle in E. Between E and H, take any point B on the first circle, and with centre B and radius BO describe an arc cutting the second circle at C; draw the straight line CBP, and make BP equal BC; then P is a point on the curve. And in the same manner by taking any number of points between E and H on the first circle a corresponding number can be found on the Lemniscate which can then be sketched in by hand. This elegant curve can be drawn in a great variety of proportions, and is available for forming the section of ogee mouldings as shown in Fig. 6, or as the contour of an ogival arch.



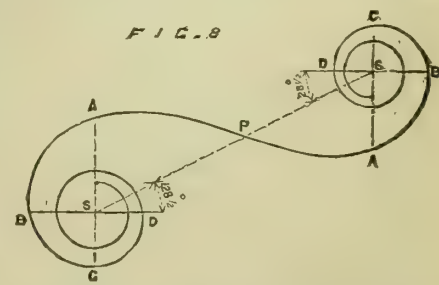
Among other curves of contrary flexure may be mentioned the "trochoid," and that known as the "companion to the cycloid," which

are both obtained by the motion of a point upon a rolling circle.

Spirals are continuous curves of unlimited length, consisting of a infinite number of successive convolutions about a fixed point or "pole," any line drawn from which to any part of the curve is called the "radius vector." Many curves of this description are known to geometers, and they were at an early period used for decorative purposes, as in the volutes of Ionic and other capitals. A simple form of spiral can be drawn by wrapping a string round a circular cylinder, and having attached a pencil to the loose end of the string, unwinding it from the cylinder, when the pencil will trace out a spiral which is known as the "involute of the circle." The "spiral of Archimedes" is another of these curves in which the length of the radius vector increases at the same rate as the angle of revolution from a fixed axis, so that the distance between the successive coils is the same throughout.

The curve which approximates most nearly to the volute of the Ionic order of Greek architecture is the "equiangular spiral," so called because the tangent to the curve at every point of its contour makes the same angle with the radius vector. This spiral can be drawn in an endless variety of proportions, and possesses great beauty of form, which is, however, often marred by the attempt to imitate its outline by means of a succession of arcs of circles. The best way to draw this spiral is to find points upon its contour and sketch it in by hand, although an instrument has been invented whereby it can be described by continuous motion. Let S (Fig. 7) be the pole, DSC the horizontal axis, ASB at right angles to the axis the depth AB and the ratio of AS to BS being given. Take SC a mean proportional between AS and BS, draw the chords AC and BC, draw the line BD parallel to AC, DE to BC, EG to AC, GF to BC, and so on for as many convolutions as may be required; then the spiral will pass through the points A, C, B, D, E, &c. To find intermediate points bisect each quadrant by the lines bSh, lSc, take Sb a mean proportional between SA and SC, and Sc a mean between SC and SB; draw the chords Ab, bC, Ce, eB, and draw Bh parallel to Ab, hD to bC, Dl to Ce, lE to eB, and so on; and in this way an intermediate point on each quadrant is found. Bisection the angles again by the lines aSg, cSi, &c., and taking Sa a mean proportional between SA and Sb, Sc a mean between Sb and SC, and so forth, we find another set of points. In this way any number of points on the curve can be found so as to enable the draughtsman to delineate it by hand. By varying the ratio of SA to SB we can obtain any variety of form we please.

Another kind of spiral which is applicable to decorative purposes is that known by the name of the "lituus," in which the length of the radius vector varies inversely as the square-root of the angle of revolution from a fixed axis. This spiral (Fig. 8) may



be said to terminate in a curve of contrary flexure, there being a bend upwards at the point P from which the curve is convex towards the axis SD, which it approaches continually but never reaches, the axis being an "asymptote" to that portion of the curve. In the figure we have shown how advantage



can be taken of this point of flexure to join two spirals of equal or unequal dimensions into the form of a Console with two volutes, the point P where they meet being on a line making an angle of  $28\frac{1}{2}^\circ$  (very nearly) with the axis.

There are several other forms of spirals which might be made use by the architect and designer of ornament; but for a full explanation of the method of describing them and their application to decorative purposes we must refer our readers to Tarn's Practical Geometry (Lockwood).

#### ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETIES.

**INTERESTING DISCOVERY AT CANTERBURY CATHEDRAL.**—For a year now past the Dean and Chapter have entertained the project of altering and improving the whole of the seating and panelling in the choir of the Cathedral, and at their invitation Sir Gilbert Scott has paid three or four visits to the Cathedral for the purpose of making the necessary preliminary inspections. The choir stalls and panelling are of the time of Charles II., and on the removal of a portion of this wainscoting Sir Gilbert Scott found that there was concealed behind a row of stone stalls, with overhanging ornamental canopies, and that the back of the seats was decorated with a beautiful broad band of green, sprinkled with gold stars. On a further removal of a section of the present oak stalls, the old Norman stone seats were more distinctly seen, and although only a small portion of the woodwork was taken down, enough was laid bare to satisfy the architect that some very interesting ancient workmanship had been hidden behind and under the modern oak fittings that fill the whole length of the choir. It is supposed that some of the stones which formed the seats have been moved to serve as foundations in other and later parts of the structure. This interesting work is pronounced by Sir Gilbert Scott to be of the end of thirteenth century, for which the cathedral was indebted to Henry de Estria (Eastrý), who was prior from 1255 to 1331, and who, amongst other additions that he made to the cathedral, erected the fine large window in St. Anselm's Chapel.

**MOUNDS IN BRITANNY.**—Mr. James Miln, F.S.S.A., has been at work during the last two summers investigating some of the ancient remains in Brittany, and has just communicated to Dr. John Stuart the following report, which appears in the *Scotsman*:—"During the course of last summer, Mr. Henri Du Clenzion (Commissioner appointed by the Committee for the Historic Monuments of France for a work on Carnac), mentioned to me that he had discovered some mounds in a piece of uncultivated land to the south of the alignments of Carnac, which he believed to be the remains of an ancient Gaulois village. I walked over the locality along with Mr. Du Clenzion, and, seeing fragments of bricks (*brignes a rebord*), pottery, &c., felt convinced that he was right in his opinion. This summer I have been enabled, with the assistance of Mr. Du Clenzion, and of Dr. De Gressy (*membre de la Société Polymatique du Morbihan*), to conduct a digging, and thoroughly to examine the first of these mounds. The results have been the exposure of the foundations of a house 10 metres square. The walls built with small stones, lime, mortar; 40 to 50 centimetres of height only left; breadth of walls, 60 centimetres. The house divided into four apartments—one large, and three small at one end. Three apartments were floored with excellent concrete, and the fourth with paving tiles. One roofing brick was found entire. After a good deal of trouble in the adjustment of other fragments, the construction of the roof was determined. Two ridge tiles have been found nearly entire, and several flooring tiles entire, also fragments of ornamented tiles, and a conduit brick nearly entire. The fragments of bricks and tiles collected amount to a cartload. Two basketfuls of fragments of pottery have been collected. The analysis of these gives a small portion belonging to an age anterior to the conquest (J. Cæsar); the larger portions are of the time of the Antonines. Some of these fragments are of fine form and beautifully ornamented:—One celt in flint, rude; several fire-stones, do.; the upper stone of a quern in tufa; iron nails and lumps of iron run into clinker; bronze pin and

ring; buckle, probably in tin; oysters in quantities, cockles, and limpets, &c.; bones and teeth in quantities, but falling fast into dust. The *tout ensemble* gives an insight as to the house, the food, the utensils, and points to a very advanced state of civilisation in this village of the Boceno, at the time of the Antonines. I hope to submit a more detailed report, with plans and drawings, on my return to Edinburgh, probably next month. In the pursuit of his studies in this country, and since the digging of the Boceno, Mr. Du Clenzion has discovered the traces of a more important city, and probably anterior to the conquest, at Mané Bras, to the south of the alignments of Kerlescan. I made a very superficial digging there last week, and with one labourer only, and in an hour's time exposed the walls of a house (square form), and collected a basket of fragments of pottery—some ornamented and very ancient—fragments of roofing bricks, and two fragments of greenish glass. A thorough exploration of the Mané Bras would throw a flood of light on the life, habitations, &c., of the Gaulois."

**THE ROMAN EXPLORATION FUND.**—A strong appeal is being made for aid to the Roman Exploration Fund. Mr. Parker long since rented a site of land at the foot of the Capitoline Hill and covering the subterranean chambers of the great prison of the time of the kings. The city improvements threaten to destroy these interesting remains, and Mr. Parker is anxious to buy the land outright and so save the chambers for future exploration. Mr. Parker has already done much towards increasing our knowledge of ancient Rome, and he attaches so much importance to the archæology of this particular spot that one may well wish success to his appeal.

## Building Intelligence.

### CHURCHES AND CHAPELS.

**GUISBROUGH.**—The parish-church of Guisbrough was reopened on Sunday last, after alterations and repairs. The architects consulted were Messrs. Armfield and Bottomley, Whitby, and the work consisted in putting in a new floor, reseating the building, substituting open stalls for the high-backed old-fashioned pews, repairing the walls and pillars, and renovating the interior of the fabric. The total expenditure has been about £1,000. Additional accommodation has been provided, and sittings are now afforded for upwards of 1,000 persons.

**MANCHESTER.**—An appeal is being made for funds for the completion of the restoration of Manchester Cathedral. The outside of Brown's Chapel has been recently completed. The pinnacles of the De Trafford Chapel have perished and fallen, and the whole of the external stonework is in a bad state of decay. But the wardens have neither power to compel the owner to rebuild nor funds to undertake the work themselves at present. The Ely Chapel has been cleaned, beautified, and fitted up for choir practice. The whitewash has been removed from the Derby Chapel and the stone cleaned. The plaster-work in this chapel, as also that of the nave, aisles, and galleries, has been distempered, and the painted roof of the nave partially redecorated. The old gilding on the bosses and ribs remains, as this is in fair preservation, and to renew it would be too costly at present. Wherever the stonework has been found in good repair, the plaster and whitewash have been cleared away, and the face of the walling cleaned; but the greater portion of the stonework underneath the plastering is too much damaged and decayed to admit of this treatment. At the south entrance an oak screen has been erected, which has added greatly to the warmth of the church. As soon as the funds will permit, the other screens, staircases, and porch doors will be constructed. The gallery beams have become so much weakened as to require propping, and these must be renewed with as little delay as possible. Since the galleries cannot well be dispensed with, it is proposed to make the new framing much handsomer, and to give the whole structure a lighter appearance. As a matter of taste, every architect would give his verdict for their entire removal, but the clergyman who sees them regularly filled by an attentive congregation must recognise their utility and desire to retain them. Considerable sums have been expended in repairs and improvements

that do not meet the eye. The heating apparatus and flues, which were nearly useless, have been put into thorough working order. The better ventilation of the building is now under consideration. The subscriptions received up to the present time, amounting only to £1,741. 18s., have been more than absorbed. For the works already completed nearly £2,000 have been paid, and those actually in hand will cost some hundreds more. The present cleaning, painting, &c., must, however, only be regarded as preparatory to work of a more solid and satisfactory character.

**POPLAR.**—On Wednesday a new church at Poplar was consecrated. The church is built in the Early Decorated style, and consists of nave, north and south aisles, chancel of ample proportions, and chapel on the south side of the chancel. The vestries for both clergy and choir are separated from the chancel by two lancet-shaped arches, with carved capitals, and inclosing arcades in wood. All the arches, as well as the general facing of the church, are of brick, with red bricks in pattern. The accommodation is for 1,000 persons, and the building has been erected by Mr. Bangs, of the Borough, from designs of the architects, Messrs. Francis, of Old Broad-street, City, at a cost of about £7,000.

**SOUTHDEAN.**—The foundation-stone of the new church for the parish of Southdean, Roxburghshire, has been laid. The building was designed by Mr. John R. Wight, St. Andrew-square, Edinburgh. The church is simple in plan—a rectangle over 60ft. by 30ft., with buttressed walls, a porch, and vestry. The style is Early Gothic. The door of the porch is in part the reproduction of an ancient doorway built into the present church, and which had done service in the pre-Reformation Chapel at Southdean. There are some interesting remains of the early architecture of the parish at Lethan—moulded stones now in dykes, and some portions of a piscina, which indicate a superior style of work. The new church has been designed in keeping with these relics.

**STOWFORD.**—The parish-church of Stowford, Devon, was reopened on Thursday week, after restoration by Messrs. Blatchford and Son, of Tavistock, from designs by Sir Gilbert Scott, with Mr. N. W. Vickers as clerk of the works. The cost of the restoration was £4,000. Built in the early part of the fifteenth century, the church was erected principally of granite, and consists of nave, chancel, south chancel aisle, north and south aisles, western tower, and vestry at south-western angle. Of these, part of the chancel and the whole of the north aisle are new. The church is singularly plain outside, contrasting strongly with the sumptuous character of the interior. The nave is divided from the aisles by granite arcades of five bays, which carry low-pitched arches of the same material. The roofs are waggon-shaped, and of oak. Those of the nave and south aisle are mainly old, but have been carefully restored where necessary. Those of the chancel and north aisle are entirely new, and have been worked out in character with the other. These are profusely carved, each wall-plate, purlin, and rib being enriched with ornaments of running design, or by rosettes, whilst the mitres of the various roof-timbers are stopped by bosses. Of these there are a great variety, quaint and original in design, but all strictly in keeping with the architectural character of the edifice. The chancel roof is further enriched by carved angels at the springing of each of the main ribs. The contract for the carved work has been undertaken by Mr. Harry Hems, of Exeter. The pulpit is of oak, upon a Polyphant stone base. The altar-rails are of open oakwork, carefully carved, and there is a new reredos of Polyphant stone. The steps to the sanctuary and around the altar are of polished Plymouth marble, and the floors of the chancel and of all the avenues in the church are laid with Godwin's encaustic tiles.

### BUILDINGS.

**BELFAST.**—A new block of business premises has just been completed in High-street, Belfast, for Messrs. Patterson and Co. The block is 60ft. high, built of red sandstone from Dumfries, after the designs of Mr. W. H. Lynn, architect. The contractor was Mr. James Henry. The front of the lower story is fitted up by Sage, of London. The general style of the building is Italian.

**GLASGOW.**—The new Western Infirmary, Glasgow, was opened on Wednesday. Designed by Mr. John Burnet, the main building, when



complete, will extend from east to west to the length of 460ft. while the portion running north and south will be 260ft. long. The building, so far as completed, will contain from 180 to 200 beds. The wards vary in size, have windows on either side, and are constructed to afford accommodation for 14 and 18 beds each. They are 15ft. in height, and their width is 26ft., affording from 105 to 110 square feet of floor-space, and 1,575 cubic feet per bed. On the basement floor are situated the kitchen—an apartment 40ft. long by 26ft. wide—the store-rooms, the laboratory, the nurses' dining-rooms, &c. To the north of the kitchen are the washing department, engine-room, and heating apparatus, while the furthest back portion of the Infirmary is occupied by a pathological theatre, an inspection theatre for *post-mortem* examinations, &c. The theatre for surgical operations and lectures is in the centre block, and is capable of accommodating nearly 300 persons. The building generally may be described as consisting of nine blocks which intersect one another at three places, the stairs, hoists, and shoots being placed at the intersections. The total cost of the building will be near £100,000.

**GOOLE.**—The extensive new buildings and alterations for male and female vagrant wards, laundries, baths, heating and hot and cold-water appliances at the Goole Union are near completion. These were approved by the Poor Law Board from the designs of Mr. E. B. Tudor, the surveyor and sanitary engineer for the town and port of Goole and the Goole Union. Mr. William Bowers is the clerk of the works.

**NEW CEMETERY AT ELMER'S-END, BECKENHAM.**—The laying out of the grounds of the Crystal Palace District Cemetery Company, between Anerley and Beckenham, is proceeding rapidly, and the tenders for the buildings will be found in another portion of our columns. The chapels will be in Kentish rag, with Bath stone dressings, lined inside with Gault and Pether's embossed bricks, and with tiled roofs. The open timbered roofs, the seats, doors, &c., are to be in pitch pine, the floors laid with Minton's tiling. The whole of the work is being carried out from the designs of Mr. A. G. Hennell, architect, of Bedford-row. The cemetery is the property of a limited company, who propose carrying it on in a similar way to that adopted by the Norwood and other cemetery companies, and which have financially met with so much success. The situation, though retired, is convenient of access to a large surrounding neighbourhood, and the land stands high, with a gradual slope towards the south.

**ROSCOMMON.**—Rathmoyle House, County Roscommon, has been during the last two years considerably enlarged and improved, under the direction of Mr. Kempster, architect, of Ballinasloe. The building is now three stories high, with a frontage of about 70ft. The flanks and front are finished in cement. Messrs. Sibthorpe and Son, of Dublin, have laid down a handsome tile pavement in the grand hall of the building.

**SCOTLAND YARD.**—On Thursday week the Commissioners of Police commenced the erection of an extensive range of buildings on the piece of waste land in the centre of Scotland-yard. The building, which is 106ft. in length and 27ft. in depth, will be built entirely of stone, the entrance being on the site of the old conduit, at the Parliament-street end of the yard. The ground-floor will be used for the Hackney Carriage Department, and consist of surveyors' and other offices, and restored property store, whilst the detective department will occupy the rest of the building. The plans of the building have been supplied by Mr. Cayn, architect to the police.

**THE NEW BILLINGSGATE MARKET.**—The foundation-stone of this market was laid on Tuesday, at one o'clock. The new edifice is designed by Mr. Horace Jones, the City architect. The total area of the market, when reconstructed, will be about 40,000 superficial feet. The basement, extending over the whole site, will be groined, and vaulted brick arches on piers will carry the general market floor on the Thames-street level. The basement, some 24ft. in clear height, will be used as a shellfish market, and will be approached by stone staircases in the middle of the Thames-street and river fronts. The general market, on the Thames-street level, will have three-fourths of its large area devoted to salesmen's stands, the remainder being appropriated by 14 shops or warehouses for salmon and other salesmen on the east and west sides of the market respectively, the large area of which they will

front. Two large taverns at the south-east and south-west extremities of the river front complete the accommodation on this floor. The market will be covered with louvre glass roofs, affording ample light and ventilation. The height of the roof-plate will be 31ft. 6in., and the ridge 34ft. Above this market will be a gallery, having an area of about 4,000ft., approached by stairs from the staircase-halls at the north and south ends of the building. This will be used as a market for the sale of dried fish, and will be lighted and ventilated in a similar manner to the general market. The design is Italian in character, and the materials will be Portland stone, with polished grey granite plinths throughout, with yellow brick facings between the upper windows. The columns supporting the heavy roof are of iron, and about 31ft. in height. The whole will cost about £100,000.

**THE NEW STATION IN THE FARRINGTON-ROAD.**—The new goods station in the Farringdon-road, which is being erected by the Great Northern Railway Company, at a cost of upwards of £100,000, will, when completed, be the largest station in the metropolis, and cover an area of 25,000 superficial yards, or rather more than five acres of land. The site, which has been purchased from the Metropolitan Railway Company, is situated to the west of the present Farringdon-road Station, and the approach is formed by a double junction with that portion of the Metropolitan line used by the Great Northern, Midland, and London, Chatham, and Dover Railway Companies. Owing to its proximity to the middle-level sewer, considerable difficulties have had to be overcome, the whole of the railway wall in the Farringdon road having been underpinned, and upwards of 50,000 cubic feet of earth removed before the railway levels could be reached. When completed, the depot will extend from Farringdon-street to Charles-street Bridge, the warehouses rising on piers, arches, and columns from the railway level below, the ground floors being on a level with the Farringdon-road. The main warehouse entrance will be in the Farringdon-road, whilst the entrance for the receipt and delivery of goods will be reached by a circuitous inclined approach from Charles-street.

#### SCHOOLS.

**LLANGOLLEN.**—On Monday new Board Schools were opened at Llangollen. The ground-plan is in the form of the letter H, and the buildings consist of boys', girls', and infants' schools, each detached, with an apartment for the meetings of the board. The style is simple Pointed Gothic, and the materials used are red Pen-y-garth bricks, with white bricks interleaved with red for the jambs and coigns. The roofs are of Festiniog blue and Carnarvonshire red slates, arranged in bands. The cost is £1,489. The buildings are intended to accommodate 300 scholars. The architect is Mr. Richard Owen, Breck-road, Liverpool, and the builders are Messrs. Ellis and Jones, Towyn.

**MANCHESTER.**—The foundation-stone of the new day and Sunday schools in connection with St. Margaret's Church, Whalley Range, Manchester, was laid on Saturday last. The ground-plan comprises infants' school, with classroom, and girls' school, with classroom. The first floor contains the boys' school, with two classrooms, lavatory, &c. The schools have accommodation for 732 children. The whole of the exterior walls are faced with white header bricks, relieved with moulded red and blue bricks to the arches of windows, &c., the whole dressed off and pointed with putty. The total cost, including the fittings, will be about £3,500. The building is being erected by Mr. John Wilson, builder, Manchester, under the superintendence of the architect, Mr. John Lowe. The rooms have open fire-places, provided with Messrs. Shillito and Shorland's patent grates.

Mr. S. A. Kirkby, M.A., has been appointed county engineer for the Southern Division of the East Riding of the county of York. After completing his articles he was assistant engineer to Mr. John Fowler, C.E., of London. In 1871 he obtained one of Sir Joseph Whitworth's scholarships for engineering, and in 1873 was appointed county engineer of Longford after a public competition. The first sod of a new people's park was turned at Limerick, on Monday.

A new Wesleyan chapel was opened last week at Ramsbottom. The building will accommodate 800 persons, and will cost £4,430.

#### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

To OUR READERS.—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.  
Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

#### ADVERTISEMENT CHARGES.

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Front Page Advertisements 9d. per line.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

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Cases for binding the half-yearly volumes, 2s. each.

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RECEIVED.—Wm. P.—H. S. and Son.—R. H. R.—S. & Co.—A. A. S.—J. W. G. and Sons.—J. B.—Dr. G. G. Z.—J. H. F.—E. W. G.

J. D. ("Intercommunication" is not an advertisement column).—O. H. M. (We do not know).—MILLS and FLETCHER (No. They are not worth giving).—ALEXANDER WOOD (Too late. Next week).—MATTHEW REED, jun. (Please send description).—AN ENRAGED COMPETITOR (See the correspondence on the Hastings Competition this week).—J. L. (Not suitable. Try again).

## Correspondence.

#### SHAFTESBURY PARK.

(To the Editor of the BUILDING NEWS.)

SIR,—My attention having been drawn to an article in your issue of Friday last, respecting this estate, I hope you will allow me—although we do not usually reply to criticisms of the press—to point out some inaccuracies which it contains. Probably they have arisen in consequence of the writer not having made sufficient inquiries before writing his article.

In the first paragraph you allege that the Company are about to borrow money under the powers of an Act recently passed. This is a mistake. The Company have recently taken powers to increase the capital from £250,000 to £1,000,000, but we have not hitherto borrowed under the Act to which you refer, neither have we any intention of doing so, although we have the power should occasion arise.

You intimate that workmen living on the estate can only reach the City by rail, at an outlay of 8d. per day. The fact is, there are three trains to Ludgate-hill and two to Victoria every morning, calling at all intermediate stations; the fare being 2d. the return-ticket, which is only 1d. per journey. Arrangements are being made with the Railway Companies to erect a station contiguous to the estate, which will facilitate transit to and from the several railway termini. Of course everybody knows that Rome was not built in a day.

The Company does not claim, as you assert, a right to manufacture and supply the gas; neither are the tenants destitute of gas, or the roads left in darkness. Over the greater part of that portion of the estate which has been completed there is gas; and the reason why there is not gas over the whole of it is because of the red-tapeism and delays of the local authorities.

On the point of the quality of the soil of the estate, I may observe that only one-eighth of the







luxury, they would object to pay a proper price for it, providing it was not, as they say, "of too expensive a character." Why, if they could only afford to spend £10,000, did they not ascertain, before issuing their instructions, whether they could get the building for that sum? In the official communication we are told that, with the aid of a competent surveyor, the Corporation have at last discovered what any architectural fledgling could have told them without a fee (and this might have been a consideration), that £10,000 was not enough for such a work; or as they put it in their resolution, "That the cost of erecting the proposed town-hall from any of the plans and designs sent in would far exceed the amount sanctioned to be laid out for that purpose." I wonder what result they expected would follow from issuing the instructions? Did they expect to get an equal number of replies stating the inability of each and all of the writers to perform this piece of architectural legerdemain for them? They could not expect this, from the fact that had they so chosen they could have had, and, for anything we know, did have this information beforehand. The only other supposition is that they must have expected the call responded to.

It has been responded to by a number of men, who, if they gain nothing more from the Hastings Town-hall Competition than the following piece of wisdom, will not have laboured quite in vain:—Beware of a corporation who cherish such grandiose notions respecting town-halls, and who, when they feel a laudable desire to embellish their town by building one, do not first set down and count the cost.—I am, Sir, &c.

L. N. Z.

SIR,—I have been professionally consulted by one of the competing architects for the erection of this Town-hall in reference to the course pursued by the Hastings Town Council in rejecting the whole of the designs.

My client considers that the Council has not acted in accordance with its own conditions, and that the competitors have been badly treated.

He thinks they should meet together to consider whether any steps should be taken to show the Town Council that it cannot with impunity depart from the conditions prepared on its behalf, and which regulated the action of the competitors.

I am instructed, through the medium of your journal, to request those competitors who feel themselves aggrieved by the conduct of the Town Council to furnish their names and addresses to me, in confidence, with a view to a meeting being held to look at the whole matter, and to decide upon the steps to be taken.

Will you please insert this letter in your next issue.—I am, Sir, &c.,

J. PETTENGILL.

32, Walbrook, London, E.C.

[We are glad to find that the hint we dropped last week is likely to be acted on. If the Hastings Town Council have made a blunder, and invited a public competition thereon, they ought in common fairness to refund to competitors the expenses they were put to; or failing to do this, the Council should be compelled to do so if legal sanction can be obtained. But as a rule, architectural competitors have been so accustomed to kicks, that they have but a small disposition to resist injustice.—ED.]

SIR,—So the Council have returned (without thanks) the whole of the designs submitted. This is hard enough, but as it would be harder still to see some of our ideas adopted without either praise or pudding, I would suggest (if you think well of it) that all the competitors should send you their designs for publication in your journal.—I am, Sir, &c.,

FAIR PLAY.

SIR,—As there appears to us no doubt that the Town Council have, in returning all the drawings submitted in competition without even awarding the premium, exceeded the powers reserved to them in the "Instructions to Architects," we have asked those of the other competitors whose names have reached us to meet us at 23, Bedford-row, London, on Monday next, 2nd November, at 3 p.m. We should be very glad if all other competitors would join us at that time, or communicate with either of us by letter if unable to attend personally.

Your kindly inserting this, will, Sir, be of great assistance in helping us to maintain the interests of the profession, which appear in this

case to have been treated with such levity.—We are, Sir, &c.,

THOMAS VERITY.  
LACY W. RIDGE.

SIR,—Your opening sentence in the paragraph announcing "the decision" in the above hardly maintains your usual character of accuracy, as, with deference, I doubt if any one will be "surprised" except the unfortunate competitors, whose complacency, overruling their judgment, permitted them to attempt compliance with impossible conditions. The conditions have been so ably criticised, that one is "surprised" any designs should have been submitted; and it is with a view of warning (if possible) intending and obliging competitors who persist in wasting their time, brains, and temper upon worthless objects, that I address you.

It is stated 250 applications were made for particulars, and as 150 were printed it is fair to presume the credulity of the profession surpassed somewhat the sanguine expectations of the Town Council; and this explains why a second edition was not issued by this obliging Corporation, the opportunity evidently being so appreciated by the architectural mind?

I prepared designs after some weeks' hard work in trying to solve the problem, and I found, as many others did (and some, no doubt, to their cost and chagrin), that the amount proposed to be expended was about half sufficient to supply the various requirements, which comprised, in fact, a tolerably complete set of municipal offices, and not a town-hall only. I decided, therefore, to withhold my drawings, and I think others might have done the same with advantage.

The ordinary unsatisfactory character of competitions is now so generally known that one is astounded at the reported number of applications for particulars, except on the hypothesis stated in the last sentence of this letter. All competitions should be scrupulously avoided where conditions seek to impose work of any kind without proper remuneration being made for it, or where compliance with them compromises an architect by causing him to do anything derogatory to his position. The fact should ever be remembered that persons who exhibit their ability in attempting to get work done on "cheap and nasty" terms are most undesirable clients to the respectable architect, as many a practitioner can testify who has ever had the misfortune to be employed by them.

And, lastly, let it be well known and clearly understood that enticing competitions are principally responded to by inexperienced members of the profession, anxious only to make a design; and the framers of particulars and conditions of future competitions may perhaps recognise the futility and absurdity of trying "to catch old birds with chaff."—I inclose my card, and have the honour to be, Sir, your obedient servant,

PRECAUTION.

## CLYMPING CHURCH.

SIR,—I cannot pass without notice Mr. Gribble's sketch of Clymping Church, published in your last issue.

In the autumn of 1872 I visited Clymping Church in the company of a friend. We both of us much admired the building for its interesting and simple work as well as its good proportions. Having spent two or three days there, we became pretty well acquainted with most of its features, and were much surprised and disappointed on seeing the inaccuracies of Mr. Gribble's sketch.

Having referred to our sketches made on the spot, and also to photographs purchased at the time, I will, with your permission, briefly enumerate Mr. Gribble's errors.

The nave roof is much too sharp a pitch, and proportion of west gable quite altered thereby. The circular window (now blocked up) is in reality much nearer the two lancets; the foliis in window are much slighter, and there are more of them; in the apex of gable a small light is omitted. The doorway of south porch has no stone lintel and corbels as shown, but a wooden head, I believe. The west doorway of tower is not blocked up with masonry, as shown and described, but it contains an old door. The weathering to window immediately over tower door is entirely broken away. There is no coping on east gable of nave, but simply an apex stone and cross. There is no weathercock on tower, but an arrow-shaped vane. Lastly, the church is not faced with stone; the stair turret and wall adjoining tower door are of ashlar work, and only stone dressings are used sparingly throughout.

I would plead for a faithful sketch, however simple, completed on the spot; for however clever a drawing may be, it is valueless if it fails to convey a true representation of the building.—I am, &c.,

A LOVER OF TRUTH.

London, 28th Oct., 1874.

## NEW STABLES, LAMPITS.

SIR,—May I be allowed to differ with the eulogium passed on these stables in your last number, for the following reasons: The elevation seems more suited for a village school, dairy, or cow-house, &c. Also to call your attention to the stable windows; there are three openings showing on plan and two only in elevation. Query, Which is correct? Also there are two chimney-pots shown and one flue only. Next take the coach-house, the gates of which are shown with the ledges on the outside, the washing-room door likewise; this is quite a new method to me of making external doors. Also please to notice the two centre gates, how

very awkward they must be when both are open. Also the gateways, according to the scale, are only 5ft. wide, and allowing 2in. for thickness of each gate, there remains only 5ft. 8in. for the entrance. Consequently, I am at a loss to know how a carriage can be got into coach-house, the usual width of a carriage with lamps attached being 6ft. Next take harness-room without any provision for light or ventilation, two of the principal desiderata for a harness-room; without which the harness would become mildewed, and metal work tarnished, and spoilt in a few days. Next, closet under stairs, without light or ventilation. Also water tank or cistern placed outside of building instead of in floor of washing-room, consequently every bucket of water must be fetched, in all weathers, day or night, from outside. See also place marked brooms, 6ft. square, without light or ventilation. Next take stables: no outer door, a most essential thing in summer, consequently all traffic must pass through cleaning-room. Loose boxes without doors; also, how are horses to be fed? there being no racks or mangers shown for this purpose. No drains in gangway back of boxes, consequently when the stables are washed down the water must drain through the horses' beds to loose box drains.—I am, Sir, &c.,

J. W. DUFFIELD.

Park-lane, Kensington-Gore, W.  
Oct. 26, 1874.

## ESTIMATING.

SIR,—The accompanying example of blind estimating has passed through my hands this week; and although some of the builders concerned may probably send it to you, I do so in the hope you will insert it as a warning to those who blindly request tenders as well as those who make them. I believe there were two other firms higher than those I send, but as I do not know the exact amounts I have not put them in.—I am, Sir, &c.

H. W. MYERS.

14, Elliott-road, Vassall-road, S.E., Oct. 29, 1874.  
For temporary offices for Thaddeus Hyatt, Esq. (Hyatt's Patent Lights), in Farringdon-road: Cooke and Green, £195; Toms, £193; Angord, £166. 14s. 2d. (!); Waldram and Co., £145; G. Porter, £124; Bayes and Rammage (accepted), £97 (!)

## Selected Correspondence.

## THE OLD HALL, LINCOLN'S-INN.\*

SIR,—Probably some of your readers may feel an interest in having information with reference to the Old Hall here, which is now being fitted up with the view to accommodate the new Appellate Court, to be established under the Judicature Act, and thus showing indeed a practical earnest on the part of the Government to carry out the changes in our judicial procedure projected by their predecessors.

The Old Hall was originally built in the 22nd year of the reign of Henry VII., 1506, and is the oldest building of the Inn. It had an open oak roof, and is lighted by six central windows of three lights and four oriel windows at the corners. It would seem that the Hall was warmed by a fire in the centre, and there was a louvre or lantern in the middle of the roof for carrying off the smoke. The arms of the Earl of Lincoln were cast and wrought in lead on this lantern, but on some reparation to it being made they were left out. Indeed, the Old Hall has been so many times repaired, as in 1625, 1652, 1704, 1706, and frequently in latter times, that the original structure has lost much of its antiquity. In 1818 the ancient lantern on the roof was removed, and the present cupola substituted, which is obviously too large and out of proportion to the original building. A more inappropriate change was made in 1819, when the oak roof was covered up with the present hollow ceiling of plaster. At that time, also, the arcade in front was added, which completely shut out the view of the building from the west. In 1841, again, when the well-known sheds for the new Vice-Chancellors were erected, the view of it from the east became also screened. At the upper end of the hall is a picture by Hogarth, the subject being St. Paul before Felix. At the lower end there is an oak screen, and in front a statue of Lord Erskine, by Westmacott. This was the old dining-hall of the Society until the new hall was built. Here revels and dances were held in olden times, and King Charles the Second and his company were entertained in State on the 29th February, 1671. Here, also, as will be seen from the headings of old law reports, the Lord Chancellor at periods held his sittings. In 1852, when the Lords Justices were appointed, it was converted into two courts, but now the partition is thrown down and the building restored to its original state in a great measure, though with new and improved seats for Bench, Bar, and public. In Herbert's "Antiquities of the Inns of

\* From the Times, October 28, 1874.



Court" will be found a plate giving a good idea of the Old Hall and the Chapel, as they appeared on entering from the east, through the great gateway from Chancery-lane. From there you entered a square with a paved way. Across to the right was the Chapel, with a line of low rails; in front was the Hall, with pathway and curbstones, and showing the windows and lantern, with weathercock and an upright fixture with three fastenings to the roof, being apparently a lightning-conductor. Perhaps at the present time the Old Hall never appears more romantic or to greater advantage than when seen on entering westward through the gateway from Lincoln's Inn-fields on a moonlight night. The modern surroundings are thrown into shade, and the original building comes out into the foreground. Thus things old and new are blended together, and the Imperial Appeal Court will commence its sittings in a building hallowed by many ancient associations.—I am, Sir, &c.,

A NEAR NEIGHBOUR OF THE OLD HALL.

#### MR. BURGESS'S SCHEME FOR THE DECORATION OF ST. PAUL'S.\*

Sir,—In the article on the proposed decoration of St. Paul's Cathedral in the *Contemporary Review*, Mr. Fergusson writes "that the Cathedral may yet be saved, but this cannot be done if those who are qualified to judge on the subject hold back, and will not speak in their own names, and say what they think." He adds,—“Of course, it is ungracious and troublesome to do so, and exposes any one who attempts it to annoyance and unpleasantness.”

With a perfect consciousness of the truth of the above, I hazard some remarks upon what has been proposed for “the adornment of St. Paul's” by Mr. Burgess, and express my opinion upon the principles which should govern the decoration of this national monument.

The kind of decoration adopted in the models exhibited at the Royal Academy is founded upon that style of the Renaissance which affects elaboration and delicacy of detail. But St. Paul's has a bold massive character in all its features; the cornices, friezes, arches, panels with enriched mouldings, and the pilasters are all in relative proportion with the main construction of the interior, and to attempt to alter parts of these, or blend with them enrichments and decorations suitable for the Certosa, near Pavia, would lead to a certain failure and a considerable waste of money.

It is impossible to refer in detail to all the parts of the building without corresponding plans; but I will allude to some prominent points which may sufficiently explain my objection.

First, in the frieze of the cornice above the main pilasters, it is proposed to add “little angels, holding wreaths of fruit and flowers, in red and green bronze.” Let any one look at that frieze and the pilasters supporting it, and say if these “little angels” would not be miserably out of place.

In the attic story above this frieze is a series of panels; in these it is proposed to place subjects of figures in white majolica, shaded in green, on a blue ground. Situated at such a height, the figures would look too small to be effective, though costing a large sum; and the proposed colouring in that situation is open to objection, and does not accord well with that suggested for the neighbouring parts.

The small flat domes in the centre of each bay “are proposed to be cut up, by mouldings executed in plaster, into a series of panels or coffers,” “the panels being filled with heads of cherubs and arabesques in brilliant colours.” The limited area of these flat domes does not allow for this treatment. They were left plain surfaces by Sir Christopher Wren, and, I have no doubt, were intended by him to be filled with paintings, for which they are well adapted.

I call attention to these details because they exemplify the sentiment prevailing in the whole treatment of the proposed decoration, which I maintain is quite unsuited to the character of the architecture; and more especially is this the case in the proposal to introduce “the figure of our Lord, of gigantic size,” and in the very early Italian style, into the centre compartment of the apse dome. But the most important change contemplated, and one which must influence the harmony of the whole colouring of the building, is the proposal to veneer the surface of the lower

wall with Sicilian marble. “From the ground to the necking of the caps of the small pilasters, it is proposed to case the piers of the nave and choir arcades and the walls of the aisles with white Sicilian marble,” and “the great pilasters in the nave are therefore treated in the same manner, but the flutes are partially filled in with coloured marble, the lower third black, and the two upper thirds red.” I protest strongly against this employment of the Sicilian marble—a material of a cold gray white tone, with shadings rather than veinings of smoky grey. I put aside for the moment the propriety of this reconstruction of the interior of Sir Christopher Wren's building; but as a base it will throw out of gear the whole scheme of colouring for the upper portion of the work. Why go to the enormous expense of this operation? I believe, with Mr. Fergusson, that the present stone walls, if inlaid with richly-toned marbles in the panels on either side of the windows and of the piers, and in other appropriate places, would look infinitely better, would be more consistent, and be more harmonious. There are many parts of the building where marble may be employed with excellent effect; but, whatever is done to relieve the walls, the main pilasters the aisles should remain stone, though relieved with gilding.

All the ornamentation should have a certain breadth of detail; the inlaid marbles, the colouring, and the gilding should be so arranged that while they decorate the building they should thoroughly associate with the existing architecture. I do not think arabesque ornament in vivid colours, as suggested in the models, is suitable. I much prefer inlaid marble of simple broad design.

Colour, if properly applied, will have a grand effect in bringing the whole interior into more pleasing harmony, and will be a valuable aid to the subject-paintings which it is to be hoped will adorn the building. As for the beautiful central dome, the decoration of it must be a labour of love to any one who undertakes it. There is a worthy model to follow in the dome of St. Peter's, at Rome, a significant example of breadth of effect and simplicity of detail. Whenever the decoration may be decided on, it would be wise to commence on the bays of the nave, from them working up to the transepts, the dome, the choir, and lastly the apse. There are many reasons for this; the various colourings could be more safely tried, greater richness more effectively evolved in the choir, and the artists to whom are committed the paintings of sacred subjects would be trained in the less important parts, for artistic work of this kind is not common in England.

I have thus expressed my opinion on the proposals for this important work; but I know the difficulty of the undertaking, and I appreciate the talent of Mr. Burgess. I consider that out of admiration of a particular style, or from some other cause, he has worked on a wrong basis by endeavouring to elaborate or refine the bold architecture of St. Paul's. I have abstained from writing till now, hoping that more able men would have done so, but the time approaches when a decisive step may be taken by the Committee, and I trust that public opinion may be so expressed as to avert what I consider would be a great calamity.—I am, Sir, &c.,

JOHN G. CRACE.

#### CHIPS.

New barracks are being erected at Normanton. They will cover an area of 10 acres. The contractors are Messrs. Parnell, of Rugby, and the amount of contract between £46,000 and £47,000.

In our notice last week of the barracks now being erected at Oxford, we stated that the facings and dressings were of Charlbury stone. We should have stated they were of Box stone worked at Box by Messrs. Pictor and Sons.

A new Church school was opened on the 14th instant, at Fortyfoot, near Lynn. The style is Gothic, and there is a master's house attached.

The proposal to convert the Tomb of Augustus at Rome into a modern theatre is said to be likely soon to be carried out. The archaeological Commission declares that the place is of no importance, and possesses no more than the name of the ancient monument.

Sir Bernard Burke, C.B., Ulster King of Arms, has succeeded the late Chief Baron Pigott as Governor of the National Gallery of Ireland.

A new School has been opened at Aberdeen, to accommodate 500 children, at a cost of £5,000.

The justices of the North Riding of Yorkshire are about to appoint a Surveyor of Bridges, at a salary of £400 per annum. Applications must reach the Deputy Clerk of the Peace, Northallerton, by the 1st of December.

## Intercommunication.

### QUESTIONS.

[3518].—Mounting Paper Drawings.—Is there any more ready method of stretching the linen than tacking it round the edges?—W.

[3519].—Antique China, Glass, and Silver.—Can any collector of above give name and publisher's address of two handbooks lately issued, on “Ancient China, &c., British and Foreign.” The works referred to give a summary of the relative values of the various brands.—INQUIRER.

[3520].—Brewery Tanks.—Having to plaster two tanks at a brewery to be used for cooling beer, &c., they cut into the old town drain, which had recently been done away with, from which was a continual soaking, causing much inconvenience to myself from the foulness thereof. The engineer having it built with red pressed bricks, I had a difficulty to get the composit to adhere to them. I recommended Portland cement, but they wished them flanked with Portland and fined with Parian, a thing I was satisfied would not stand, but could not prevail. I used about one peck of washed sand to one bag of Parian, which set nice and hard when finished. Those who employed me said they should get the credit, for the work looked well. They were filled with water the third day, and the Parian gradually dissolved; of course I am wrongfully blamed and cannot get my money for labour. I should feel much obliged if you would advise me what to do.—J. POLLARD.

[3521].—Prime Cost.—What is the exact meaning of these words in specifications? For instance, what is the prime cost of an article of which the gross price is £50, delivered free, subject to 20 per cent. discount, with a further discount of 2½ per cent. on the balance if paid within 30 days?—Y.

[3522].—Staining Oak.—What is the best method of staining oak dark? And what oil should be used when specified to be finished with oil? Is there any way of staining pitch-pine after it is varnished?—JUNIOR.

[3523].—Extras and Deductions.—A free expression of opinion is solicited upon the following vexed question: A contractor, in consideration of a stated amount, undertakes to erect a building in accordance with drawings, specification, details, and instructions supplied by a given architect, expressly stipulating at the same time (in the contract document) to take the risk of any quantities supplied, and to be paid only (beyond the contract amount) for such extra works as may be especially ordered in writing by the proprietor. The work in question being reported complete, the proprietor is prepared to pay for all extra works ordered by him in writing, as stipulated. The question now arises, is he (the proprietor) entitled to allowances and deductions from the contract amount for work not executed in accordance with the drawings and specification aforesaid, as follows: 1. Amounts particularised in the specification as being available for disbursement by the proprietor at his option; such as specific sums for contingencies, heating-apparatus, cupboards, glazing, gas-fittings, and the like, for the execution of which the proprietor has employed and paid other tradesmen. 2. Work indicated on the drawings but not executed, such as steps, walls, roofs, doors, screens, rainwater-pipes, drains, railing, &c., &c. 3. Work put in, but of less dimensions, inferior quality, or with less labour upon them than shown or specified. 4. Work shown on the drawings but not specified. 5. Work specified but not shown on the drawings. 6. And finally, can the contractor substantiate a claim for variations introduced at his own pleasure, with the verbal sanction of the architect, in compliance with the contractor's wish, and to suit his convenience, and not with the desire of either architect or proprietor, or with the warranty of a written order?—F.

[3524].—Chimney Stacks.—Will some one amongst your numerous readers give the particulars of diameter and heights of the two chimney-stacks that fell some years back, the one at the Counterslip Sugar Works, Bristol, and the other at Joynton's Paper Works, St. Mary Cray.—J. WATKINS, 2, Chesterfield-street, N.

[3525].—“Fors Clavigera.”—Mr. Ruskin, how can I get “Fors Clavigera?” My news-vendor does not know it, nor can he get it. What is the cost, how often is the work published, and to whom is the subscription to be sent?—L.

[3526].—Inclination of Sewers.—I want to know the least inclination given to any of the new sewers of London, with the ordinary flow through any of them; also their dimensions, and whether concrete foundations have been adopted in any cases.—G.

[3527].—Hollow Arch Bricks.—Can any one inform me if any bricks are made to different curvatures applicable for vaults, and of hollow section; and, if so, where they are procurable? A light kind of moulded brick is much required for vaults, and also in positions where weights would be injurious to the abutments. Such a form of vault is not new, and many Roman buildings are domed or vaulted with a kind of hollow pottery, but I do not know if there are any manufactured in London.—H.

[3528].—Mason's W rk.—1. Would a pair of pointing-stones, 2ft. square, do for general work? 2. Not having seen any used but those with scale on the stones, would require to know how it is done with-

\* Times, October 28, 1874.



out the scale? 3. What height off the ground would be best to fix them for a figure 4ft. high; whether against the wall or in the clear? 4. Can the back of the figure be done without turning the figure and refixing it? As I have never done anything but bas-reliefs with the old-fashioned instrument and scales, any practical information as to general method and the instrument now in use would be very useful.—MASON.

[3529].—Ants in Houses.—Some two years since I altered the basement of my house from a dwelling kitchen to a tailor's workshop, taking up the boards to make an independent drain, after which covering the whole with lime and rubbish, making a sort of loose concrete under that part which is covered with the shopboard, all under the advice of my builder. Since then the place has been overrun with ants, all over the house of ten rooms, which are now a serious inconvenience. Can any of your correspondents advise me in your next issue how I can extirpate them. I have applied to several parties for advice, but no one can help me, hence my troubling you, which pray excuse.—W. H. J.

[The best remedy "W. H. J." can apply is to lay powdered *corrosive sublimate* along the track of these insects. He will find the remedy easy and effectual, though some care must be exercised for the safety of children or domestic pets.—ED.]

[3530].—Hydraulics.—I have fixed a cistern with a 1½ in. overflow-pipe, 12 in. below the top. This pipe descends about 17ft., then traverses underneath the ground 35ft., and ascends perpendicularly 12ft. to another cistern. The water will not run into this last cistern, although there is a head of water 12 in. deep in first, and also a fall of 5ft. The pipe is quite clear. Should like an opinion on the point?—N. H. H.

[3531].—Finding Radius.—Can any correspondent of the BUILDING NEWS give the reason of the rule, in paragraph 1,925b of Gwilt's "Encyclopædia," for finding the radius of the 1st quarter of the spiral  $\frac{h}{h+b} = \text{radius}$ , where  $h$  and  $b$  are the height and breadth? Also are not the figures in the last part of the next paragraph misprints? Should they not be nearer 1:13:1 and 1:20:1 for a good spiral.—H. B.

## REPLIES.

[3471].—Traps for Sinks.—The best plan to adopt is to cut the hole in the stone sink large enough to admit the pipe through, excepting the flange (if a 3ft. length can be obtained it is better). A common W.C. syphon trap set in the ground and an iron or brass grate cemented into the socket of pipe will make the best trap and waste for kitchen sinks. I mean common glazed drain-pipes, 2 in. if you can get them.—T. S.

[3477].—Indelible Water.—Mr. E. J. Hubbard recommends Syke's Indelible water to fix ink and colours. I should be much obliged to him, and I have no doubt others too will, if he gives the readers of the BUILDING NEWS some clue to finding out the existence of such an article.—J. L.

[3514].—Payment for Quantities.—A quantity surveyor who trusts a builder for even a portion of the quantity-money until near the completion of the building is not so shrewd as such individuals are deemed to be. The building committee can pay the surveyor, and should do so, as they are the surveyor's debtors; provided the quantities were taken by the surveyor at their request, or with their sanction. If the surveyor took the quantities for the builder direct, and to his order only, he will doubtless become the recipient of the customary *solutum* 2½d. in the £, or thereabouts, out of the builder's estate.—F.

[3514].—Payment for Quantities.—I think "Surveyor" should make his claim on the committee. Whether he can demand the charge for quantities from them depends on his appointment. If the committee, or their architect, employed him to take out the quantities, I think he can sustain a claim; if the builder employed him he could only come upon the estate.—G.

[3515].—Front of a House.—That side which contains the hall door, or principal entrance, is called the front; on this account it is generally more ornamented than the others.—VI ET VIRTUTE.

[3515].—Front of a House.—The front of a house may mean the entrance side, though not invariably, as side entrances are often preferred; in such a case the front would be the side in which the main outlook or prospect was obtained, or the position of the chief windows. This really constitutes the front of a house, and "W. H. R." had better manage to adjust his front to the south-east, which is the best aspect; if he cannot do this, he can place his entrance on the east side, making it an important feature in the elevation, and so manage to put his chief windows that they may fall both ways if possible. The "front" of a house has more of a relative meaning in reference to approach or some other surrounding condition. Thus the front of a mansion standing in its own grounds may either mean its garden front or its entrance front, and these may be on opposite sides. There is no exactness in the definition, though it certainly means one or the other of these sides.—G. H. G.

[3516].—Zinc Roof.—It is a difficult thing to advise student what to do. A badly laid zinc flat is an evil not easily remedied unless it be relaid. We do not think tar and sand would be lasting, as it

would be affected by temperature if put on the zinc. We are not told where the wet comes through; if it is through imperfect flashing, cement fillets on the brick work or surrounding part would probably remedy the evil.—G.

[3516].—Zinc Roof.—"A. B." does not say what is the cause of the wet coming through, whether it is laid on an insufficient fall, or whether the joints have been soldered and are cracked. Tar and sand is the worst thing you can use, as it will destroy the zinc in the course of two years. I should recommend you to ask an honest zinc-worker to examine it and advise the cheapest remedy.—G. T. HOWELL.

[3517].—Flow of Water.—The propounder of this question must state what head of water is maintained at the source of the pipe, as the velocity of the flow varies as the square root of the head (see Tarn's "Science of Building"). Until the height of head is known, no solution can be given to the question.—E. W. T.

[3517].—Flow of Water.—The pipe described by "Watercourse" will deliver 9½ gallons of water per minute, so long as it remains free of incrustation.—ZED.

[3517].—Flow of Water.—If the pipe was quite straight the quantity of water would be 647.25 gallons per hour (that is running full), but with the bends "Watercourse" cannot expect more than 600 gallons.—VI ET VIRTUTE.

## STAINED GLASS.

DROGHEDA.—A stained-glass memorial window has been erected in St. Peter's Cathedral church, Drogheda. Mr. Maurice Brooks was the artist. The window, which is in the Decorated Gothic style of architecture, consists of four principal divisions. Between the mullions, in the centres of which are placed large-sized figures of the Evangelists, two and two, at the sides, and midway, are, in corresponding figures, SS. Peter and Paul.

ROKEFORD FITZPAINE.—Three memorial windows have been erected in the parish church of Okeford Fitzpaine, Dorset. The large one, which is the chancel window, immediately over the Communion-table, is divided into three compartments. In the centre one is a representation of the Crucifixion. On one side of this centre window is an illustration of The Agony in the Garden, on the other the burial scene in the garden of Joseph of Arimathea. On one side of the Communion-table is a window depicting two Resurrection scenes. The window on the opposite side contains illustrations of Mary washing Jesus' feet and the Last Supper. The windows are the work of Mayer and Co., of Munich and London.

READING.—A new stained-glass window, by Clayton and Bell, has just been erected in St. Giles's Church, Reading. The style of the work is Decorated, and the window contains figures of St. John, St. Peter, St. Paul and St. Timothy, and below these are representations of the administration of the Sacraments of Baptism, the Eucharist, and Holy Matrimony, and the Burial of the Dead.

## STATUES, MEMORIALS, &c.

MEMORIAL TO THE DUKE OF KENT.—The memorial to the Duke of Kent, which the Queen is about to place near the site of the Beaufort Chapel, in St. George's, Windsor Castle, will consist of an alabaster sarcophagus surmounted by a white marble effigy of the Duke. It will be from designs by Sir G. G. Scott, the architect, and is now in the hands of the sculptor, in the atelier of Messrs. Poole, Field, and Sons, of Westminster. The bases and moulded panels are of Derbyshire alabaster, carved and polished. The head of the tomb has a quatrefoil panel with the arms of George III. and his Queen, surmounted by a crown. On the square panel at the foot, which will be towards the west, is a dedicatory inscription.

## WATER SUPPLY AND SANITARY MATTERS.

BALDOCK.—On the 15th inst., Mr. J. T. Harrison, C.E., held an inquiry at Baldock, Herts, relative to an application from the Baldock Local Board to the Local Government Board for permission to borrow £2,000 for works of sewage, and for the purchase of land for sewage irrigation.

BEDFORDSHIRE.—At a special meeting of the Bedfordshire Local Board, held on Monday, Mr. Melk, of the firm of Messrs. Melk and Nisbet, engineers, submitted an enlarged scheme of water supply, namely, to supply daily twenty gallons per head for 20,000 persons, as recommended by Arnold Taylor, Esq., of the Local Government Board. The estimated cost of the scheme is £26,000, and it was unanimously adopted, on the motion of the chairman; and it was also resolved to seek the sanction of the Local Government Board, to the application for a loan of £26,000 by the Local Board.

BRIDPORT.—The Bridport Town Council have applied to the Local Government Board for sanction to borrow £10,000 for works of sewage. The usual official inquiry was held on Wednesday week, before Major Hector Tulloch. Mr. Shopland, C.E., of Swindon, attended with plans of the proposed works, which he explained in detail. In the course of the discussion, the inspector suggested that they might let the sewage on to the land

direct instead of having tanks and pumps. He did not insist upon that idea, but it had been carried out with great success in many towns. The inspector said it had been estimated that one acre was sufficient for the sewage of 3,000 persons. He did not quite agree with that, but he thought seven acres would be enough for Bridport. At the close of the inquiry it was understood that the engineer would consider the point raised by the inspector, who, at the same time, unhesitatingly recommended the loan.

CHELTEMHAM SEWAGE FARM.—The sewage farm of Cheltenham has this year been let by tender, instead of, as usual, by auction, the tenders sent in in response to the board's advertisement being considered sufficiently satisfactory to warrant this departure from the usual rule. The amount tendered is an advance on the receipts for any year hitherto, and it is a noticeable fact that the only lot upon which there has been a falling off from the price given the first year is a small field of six acres broken up for rye-grass. The average per acre for the four years has been: 1872, £6. 12s. 3d.; 1873, £6. 8s. 4d.; 1874, £6. 8s. 4d.; 1875, £6. 15s. 7d.

DRAINAGE OF WIMBLEDON.—On Saturday week the Wimbledon Local Board had under their consideration the remaining contracts for the completion of the sewage works of the town. Thirteen tenders were sent in for the manufacture of pumping engines and other machinery, and for the erection of engine houses. It was resolved to accept the tender of Mr. W. F. Mason, of Ipswich, for engines and machinery at the sum of £4,195, and the contract of Mr. W. Crockett for the erection of engine-houses at £5,265. The amount of these contracts, added to the cost of the former ones, which have been accepted and are now being carried out, will form a total expenditure of nearly £50,000.

FINCHLEY.—At the last meeting of the Finchley Rural Sanitary Authority, the chairman proposed to take into consideration Mr. Baldwin Latham's plan for the drainage of Finchley and Friern-Barnet. Thereupon one of the Guardians (who form the Sanitary Authority) moved, as an amendment, "That having regard to the large outlay (estimated at from £60,000 to £70,000) which will be incurred in carrying out the drainage of the parishes of Finchley and Friern-Barnet, and to the fact that Mr. Baldwin Latham's scheme has only recently been issued to the ratepayers, who have not yet had an opportunity of considering the same, and further to the absolute fact that it will not be possible to apply to Parliament next session for its sanction to the scheme, this Board resolves to defer the consideration of the said scheme for one month from this date." This amendment was carried, to the disgust of the chairman, who at once quitted the chair.

HADDINGTON.—New works for the supply of the burgh of Haddington with water were inaugurated on Saturday by Lord Elcho. Formerly the town depended for its water on wells; now, however, an adequate supply of pure spring water, amounting to over 100,000 gallons per day, which is equal to 25 gallons per head per day to the present population, has been introduced by gravitation from some springs on the estate of the Earl of Wemyss, 4½ miles from the town, at a cost of about £5,000. Mr. Leslie, C.E., was the engineer of the work, and Messrs. Thorburn and Sons, of Dalkeith and Haddington, the contractors.

HOVE.—At the ordinary meeting of the Hove Commissioners, on Thursday week, the Works Committee reported that they had applied to the Local Government Board for sanction to borrow £5,000 to meet the cost of ventilating the sewers in that district.

THE WATER SUPPLY AT FIRES.—At a recent meeting of the Court of Common Council, a report was presented from the Gas and Water Committee on the subject of the water supply at fires. The committee were of opinion that although there was ample supply for all purposes, yet the system of street-plugs was not suitable to meet sudden emergencies, which must necessarily occur in every case of fire, and that, to secure a quick supply of water, it is absolutely essential for the protection of public property that a proper number of constantly-charged hydrants, representing an immediate supply of water, should be fixed. After some discussion, in the course of which Mr. George Rooke, a member of the Metropolitan Board of Works, stated that the carrying out of the report of the committee would cost in the first instance two millions of money, and consequently an annual expenditure of £40,000 or £50,000, the report was almost unanimously adopted.

STRETFORD.—On Tuesday Mr. Arnold Taylor, an inspector appointed by the Local Government Board, held an inquiry at the offices of the Stretford Local Board, at Old Trafford, pursuant to an application by the Board for sanction to borrow the sum of £21,168 for works of sewerage, and £4,565 for works of private street improvement. Ultimately it was decided, on the suggestion of the inspector, to amend the plans, and submit them again on a future occasion.

## LAND AND BUILDING SOCIETIES.

SHREWSBURY.—The adjourned annual meeting of the Shrewsbury Permanent Freehold Land and Building Society was held on the 12th inst. The annual report regretted that the anticipations of last year had not been realised, the result being that the net profits amount only to £235. 19s. 3d. Liabilities, total, £13,202. 10s. 5d. Assets, £11,460. 19s. 8d. Deficiency £1,741. 10s. 9d.



## LEGAL INTELLIGENCE.

**CONDITION OF THE CITY STREETS.**—At the Mansion House on Monday, two street scavengers in the service of the City Commissioners of Sewers attended again before the Lord Mayor and Mr. Alderman Finnis, at the instance of the Metropolitan Board of Works, upon a summons charging them with an infringement of the 205th section of the Metropolis Local Management Act in having swept mud and rubbish into a gully communicating with a sewer. They pleaded "Not Guilty." On the afternoon of the 11th of Sept., a very wet day, the two defendants were engaged in cleansing the roadway of Gracechurch-street between Lombard-street and Lombard-court. They used indiarubber scrapers to collect the mud and other refuse into the gutters. They then swept the whole mass down the gullies, instead of letting it remain to be carted away. After an elaborate statement from Mr. Baylis for the defence, the Lord Mayor held that the case had been proved, and remarked that the City Commissioners of Sewers must not, in their very laudable and successful efforts to keep the streets clean, infringe the useful provisions of the section under which the complaint had been preferred. He must decide that the law had been violated, and he hoped that would terminate the strife. It was a question of principle, and not of punishment, and he should therefore only inflict upon the defendants the nominal penalty of 1s. each. Mr. Fry asked for costs. The Lord Mayor said the Metropolitan Board were better able to pay the costs than the defendants.

**REMOVING PUBLIC SEATS.**—At the Hampstead Police-court, on Wednesday week, George French, a carman in the employ of Mr. Willett, a builder, carrying on extensive works in Belsize-avenue, was charged on a summons before Messrs. Marshall, Faulconer, and Smith, with damaging and removing six public seats, the property of the Hampstead Vestry, from Belsize-avenue. Evidence was given to show that defendant was seen carting away some of the seats about half-past five on the morning of the 2nd ult., and they were afterwards found on Hampstead-heath. Damage amounting to £2.10s. 4d. was done. Defendant admitted removing the seats, but said he was acting in accordance with the instructions of his master, Mr. Willett, because the seats were a nuisance to the houses he had built. Mr. Willett, jun., said the seats were torn up by his father's orders, because Mr. Lowe, the Vestry's surveyor and inspector of nuisances, had not paid attention to a letter sent to him by a resident there, complaining of them. They were sometimes occupied all night through by improper characters. Mr. Marshall said that Mr. Willett ought to have taken proper steps to bring the matter before the Vestry. All public seats might be used by improper persons. The decision of the Bench was that defendant must pay a fine of £1 and 8s. costs.

**HOUSE-OWNERS' LIABILITY TO WATER-RATES.**—Mr. Blow, a builder, of Blackheath, appeared on Monday, at the Greenwich Police-court, to a summons, charged with refusing to pay a sum of £6.15s. 6d., being the amount of rate charged by the Kent Waterworks Company for water supplied to the occupants of several small houses of which he is the owner. The defendant disputed his liability, saying the rate ought to be paid by the occupiers, and that sufficient notice had not been given to him by the company, so as to enable him to secure himself in the amount of rent paid. Mr. Holland, solicitor, who represented the company, pointed to sections in the company's Act of Parliament, obtained in 1864, conferring upon the company the right of charging the owners of property of a less value than £20 per year, whether let in tenements or not, with the cost of water, and also to the defined rate of charges to be made for such supply. Mr. Patteson made the order asked for, telling defendant he had the remedy in his own hands.

## CHIPS.

Mr. William Tweedie, the well-known publisher, who was for the last nineteen years Chairman of the Temperance Permanent Land and Building Society, died on Tuesday from cancer in the larynx.

The gale last week did considerable damage. The wall of a house was blown down in Charterhouse-street, London. At Gainsborough the spire of a new cemetery chapel in course of erection came to grief, and a large portion of a new Baptist chapel at Leeds was overthrown by the force of the wind. This building suffered a similar mishap in December last; the contractors are Messrs. Longley Brothers, of Hunslet.

The foundation-stone of a new Conservative Club House was laid on Monday week, at Stoke-upon-Trent. Mr. C. Lynam, of Stoke, is the architect, Messrs. Gee and Co., of Stafford, being the contractors.

The parish-church of Old Basing was reopened on Tuesday week after restoration. The work includes new roofing, new floor tiling, new pews, the placing of choir desks under the tower, a new Communion-table and lectern, a stained-glass window, a warming apparatus, and the entire renovation of the interior. Mr. T. H. Wyatt was the architect, and Messrs. Holland and Hannen the contractors.

At the meeting of the Bishop Auckland Local Board of Health on Thursday week, the plans of Mr. R. R. Rule, architect, for altering the Talbot Hotel, were passed.

## Our Office Table.

**ROYAL INSTITUTE OF BRITISH ARCHITECTS.**—The inaugural meeting of this Institute for Session 1874-5, will be held on Monday evening next, at Conduit-street, when the president, Sir G. G. Scott, will deliver an opening address. The presentation of the Royal Gold Medal, rejected by Mr. Ruskin, but subsequently accepted by Mr. G. E. Street, R.A., will also take place, although, in consequence of a domestic bereavement, Mr. Street will be unable to attend. He will receive the Medal by deputy. A committee has been appointed by the Council for the procuring and selection of papers to be read at the ordinary general meetings, and members who are willing to prepare papers are requested to communicate with the committee at once through the secretary. The following papers have been already promised, and will be read during the Session, although the precise dates are not yet fixed, viz.:—(1) "On the Orwell Park Observatory," by J. M. Anderson, Fellow. (Mr. W. Airy, C.E., will explain the scientific portion of the work.) (2) "On the Old Hall at Gainsborough," by C. Hatfield, Fellow. (3) "On Public Abattoirs, with special reference to one recently erected in Manchester," by A. Darbyshire, Fellow. (4) "On Iron as a Constructive Material," by C. H. Driver, Fellow.

**PROPOSED BRIDGE AT CHARING CROSS.**—A writer in the BUILDING NEWS for Sept. 4th last suggested that in connection with the new street now about to be made from Charing-cross to the Victoria Embankment, among the *desiderata* which might be well provided was a new bridge from Charing-cross to Lambeth. Now, without contending that a bridge at that point is a *present* necessity (although the tolls imposed for crossing Waterloo-bridge go far to make it so), we are well aware that many persons regard a bridge at that point as inevitable, and that at a date not very far in the future. This being the case, we were very glad to see that at the last meeting of the Metropolitan Board of Works, Mr. Fowler brought forward the following motion:—"That before the Board finally decides on the gradients of the new road to be made from Charing-cross to the Victoria Embankment, the engineer do report on the feasibility of constructing a bridge over the Thames in continuation of such new road." Now surely this was a reasonable proposition, and would have committed the Board to nothing except the more or less adequate provision for the approach to such a future bridge, if, in the opinion of the engineer, such provision was feasible; yet the motion was ridiculed and hardly listened to, no stronger objection being urged against it than that the time of the engineer and of the officers of the Board was "too valuable to be frittered away in inquiring into such impracticable suggestions!" The Board, in its wisdom, has chosen to taboo Mr. Fowler's suggestion, and this in spite of the enormity which has been perpetrated at the point where Lambeth-bridge connects with the Albert Embankment on the south side of the river. Some of our readers may know that Lambeth-bridge and the Albert Embankment are almost contemporary as to their construction. Scarcely was the former completed than the latter was commenced, and the works were designed entirely independently of each other. No suggestion such as that made by Mr. Fowler on Friday last was offered, or if it was, it passed unheeded, and as the result of this want of foresight or common-sense, the Albert Embankment is disfigured by the lowering of the pavement and the parapet wall so that the footpath nearest the river may be carried under the bridge girders. This and many other eyesores in London might have been averted by the adoption of such common-sense and practical suggestions as that which the members of the Metropolitan Board of Works thought fit to ridicule on Friday last.

**MR. COLE'S WANTS.**—Mr. Cole attended as one of a deputation to the Home Secretary on Wednesday, for the purpose of urging the adoption of an improved scheme of Municipal Government for London, and took the opportunity of submitting to the Home Secretary a list of some of his personal wants connected with science and art, which he thought a municipality would relieve, and which were the wants of only 3,000,000 persons besides himself:—"I want,"

said Mr. Cole, "health and sweet air, but close to my house there are three several openings into the sewers, which stink at times, increase my doctor's bill, and shorten my life, but the vestry cannot give me any remedy. I want a constant supply of water, unpolluted by sewage. I want it as pure as the water of Glasgow and other provincial towns. I want to pay for what I use at cost price, but cannot get to do so. I want bright gaslight at prime cost, and not to pay double the price that my country cousins pay for it. I want roads properly kept, free from dust in the summer and from snow and mud in the winter. I want clean paths across the roadway to the South Kensington Museum, but the vestry will not let me have them because they would wear the road. The vestry cannot afford paved crossings, although the museum has been the means of putting thousands of pounds annually to the parish rates sheet. I want to be able to drive in a cab as good as a Paris *remise*, but I cannot do so because the parish will not allow a shelter for cabs in the streets. I want to see some old Campden charities in my parish, of which I am a trustee, applied to provide lodging-houses and baths and wash-houses for the poor, and a local school for technical instruction; but the vestry cannot help me. I want the best, which is the cheapest, administration; but I get the worst, which is the dearest. Before I go to my grave I want a Conservative Government to relieve these my wants, having looked in vain during the last forty years of my life for help from a Liberal Government."

**STREET-LIGHTING.**—The new lamps which have been put up at Waterloo-place are placed there at the expense of the patentee. They are called "Bartlett's Boulevard lamps," and lamps of the pattern have been used since 1871 in New York. They are also in use in other cities of America. The glass-shade is oval in shape, with the lower part open; the glass itself is very thick and strong; but the principal improvement is the use of two porcelain reflectors, the one on the lower part of the chimney, the other at the centre of the glass-shade or bell, which succeed in throwing down on the pavement considerably more light than do the street-lamps ordinarily used in London. Both these reflectors are outside the shade, and thus escape being blackened by the smoke. The upper one radiates light to a distance, but always downwards; the lower one sends the rays down near the lamp all round, and prevents any shadow being cast. In a band round the upper part of the lamp, above the lower reflector, the name of the street is stencilled in ground glass. The "Boulevard lamps" cost more than the ordinary square street-lamps. The expense of repairs, however, is said to be less, owing to the strength of the glass.

**JOHN RUSKIN, TEA MERCHANT!**—Mr. Ruskin has set up a tea warehouse. Subscribers to the *Fors Clavigera* have lately received from Mr. Ruskin's Kentish publisher, with their copies, a card with the name "Harriet Tovey, tea and coffee dealer, 29, Paddington-street, Portman-street," printed upon it, and at the back a written statement to the effect that "Mr. Ruskin's object in setting up this shop is that the poor round about may be able to get their tea and coffee pure and unadulterated." If Mr. Ruskin or someone else would open a number of tea and coffee-rooms in London, where those beverages might be drunk pure and properly made, at moderate charges, in a place with some pretensions to cleanliness, comfort, and proper ventilation, the projector would deserve the thanks of the public and a profitable return on his outlay.

**PROFITS FROM SLATE QUARRIES.**—Slate quarrying appears to be a profitable pursuit, at any rate, the late Lord Palmerston found it such. In the third volume of Lord Dalling's *Life of Lord Palmerston*, a letter from the deceased statesman to his brother, Sir William Temple, is published, in which he refers to his slate quarries in Wales. He had sunk a very large sum in developing them, no less a sum than £30,000. He acted under the advice of Mr. Bidder, known in youth as the Calculating Boy, and afterwards a partner of Robert Stephenson, the engineer. That the advice was wise may be gathered from a statement made by a correspondent, that the income derived from those quarries last year was about £50,000.

**CHURCH AND SCHOOL BUILDING.**—In speaking at the consecration of a new church, last week, at Chesterton, near Cambridge, Mr.



Marten, M.P., contrasted the small number of 43 new churches built in the decade ending 1810 with the large number of 1,110 built in the decade that closed in 1870. The cost of these 1,110 new churches was not less than 18 millions, in addition to which enormous sums were spent in restorations, especially in the case of eleven cathedrals. Simultaneously with this outlay, Churchmen spent three and a half millions in the erection of new schools, the maintenance of which involves yearly contributions to the amount of nearly £400,000.

**BUILDING SOCIETIES.**—On Monday next the Act of the late Session (37th and 38th of Victoria, cap. 42) to Consolidate and Amend the Laws relating to Building Societies will come into operation, and effect some considerable alterations. The Registrar of Friendly Societies is to be Registrar under the Act, which has effect in the United Kingdom. A definition is given of terminating and permanent Societies, and provision is made to continue Societies under the former Act. Societies are to be incorporated, and the enrolment to be sent to the Registrar. Any number of persons may establish a Society under the new Act, either terminating or permanent, for the purpose of raising by the subscriptions of the members a stock or fund for making advances to members out of the funds of the Society upon security of freehold, copyhold, or leasehold estate by way of mortgage, and any Society under the Act is to have power to hold land with the right of foreclosure, and may raise funds by the issue of shares, either paid up in full or to be paid by subscriptions. The land to be obtained by a society to be sold and converted into money. With respect to the liability of members it is now declared that "the liability of any member of any society under this Act, in respect of any share upon which no advance has been made, shall be limited to the amount actually paid or in arrear on such share; and in respect of any share upon which an advance has been made, shall be limited to the amount payable thereon under any mortgage or other security, or under the rules of the society." There are 44 sections in the new Act, and a schedule of forms to be used in carrying the same into execution. The rules of a society are to be binding on the members and all persons claiming on account of a member. Officers are to give security, and all surplus funds are to be invested. By one of the provisions the property of a society is to vest without a conveyance.

**REPAVING LONDON BRIDGE.**—On Wednesday week the ordinary carriage traffic of London-bridge was resumed, the repairing of the roadway by Messrs. Mowlem and Co. having occupied exactly twenty working days, as the bridge was partially closed on the 28th September. The work was completed within the stipulated time, although the weather was unfavourable for several days, about 200 men having been employed.

**OPEN SPACES IN THE CITY.**—A very sensible motion, made by Mr. Deputy Stapleton, was carried at the meeting of the Court of Common Council on Thursday week. By its recommendation, the Coal and Corn and Finance Committee are directed to inquire as to existing open spaces, and what steps (if any) should be taken to preserve them for the public; especially to inquire if access during the daytime be obtainable by the public to the gardens of Trinity-square, Finsbury-circus, and the inclosed ground around St. Paul's Cathedral, and to report thereon to the Court. Each of the three inclosures referred to might very well, under proper regulations, be thrown open to the public. Trinity-square, especially, would be appreciated by the inhabitants of the thickly-populated neighbourhoods which adjoin it; Finsbury-circus has long since ceased to be what it once was—a private garden for the residents of the houses round it, which are now, for the most part, devoted to business or professional purposes; and any change would be welcome likely in the remotest degree to improve the forlorn appearance of that most desolate-looking churchyard of the Metropolitan Cathedral.

**ART INSTRUCTION FOR PUPIL TEACHERS.**—The Bradford School Board last week decided to pay half of the fee of 5s. for those pupil teachers who are willing to pay the remainder, and attend the pupil teachers' classes on art at the local Mechanics' Institute; this is to apply to the present session only; in future sessions the board will pay the entire fee for those who merit it by examination, and half for the remainder. This course has already been adopted with good results in some other northern towns.

## CHIPS.

A new font has just been erected in the priory church of St. Mary, Old Malton. It was designed by Mr. Fowler Jones. It is of Caen stone, and of semi-Norman or Transitional design, and the carving is late Norman. Mr. Thewick, of York, was the contractor, and Mr. Cole, of York, executed the carving. A new reredos, of diaper pattern, has also been inserted.

A new company has petitioned the Commissioners of Sewers for leave to erect newspaper kiosks, cabmen's rests, and a variety of other public conveniences in the metropolitan streets. The solicitor nipped the project in the bud by expressing an opinion against the power of the Commissioners of Sewers to let any portion of the public thoroughfare.

The foundation-stone of a new Catholic Hall, at Belfast, has been laid. Mr. A. McAlister is the architect, and Messrs. James Ross and Son the builders.

At a general meeting of the ratepayers of the precinct of Whitefriars held last week, it was resolved again to request the Metropolitan Board of Works to construct a new street, affording access from Fleet-street to the Thames Embankment.

The Bishop of St. Asaph still refuses to consecrate the new church at Denbigh, in consequence of the "ritualistic tendency of the reredos."

New Schools, built for the Christian Brothers, have been opened at Belfast. Mr. A. McAlister is the architect, and Messrs. Rooney and Mooney the contractors.

Holy Trinity Church, Gee Cross, was consecrated last week. The building has cost about £2,000, and will seat 300 persons. The church is of stone throughout. The architects are Messrs. Medland and Henry Tayler, and the general contractor Mr. Peter Green.

New Jewish Schools were inaugurated on Saturday at Walworth. Mr. Lewis Solomon is the architect, and Mr. Cohen the builder. The desks (Moss's patent) were supplied by Mr. Geo. M. Hammer.

The foundation-stone of a new temporary Free Church of England was laid at Southampton, on Wednesday week. The building, which is of iron, will accommodate 400 persons, at a cost of £300.

The parish-church of Campden, is to be restored from designs by Mr. Habershon, at a cost of £4,400.

Kington Church, Herefordshire, has been reopened after restoration from designs by Mr. R. W. Drew.

New schoolrooms in connection with Carey Baptist Chapel, Reading, were opened on Tuesday week. The cost of the new building is £850. Mr. J. Cooper, jun., was the architect, and Mr. Woodroffe, Bridge-street, the builder. The school will accommodate 350 children.

The proposed enlargement of the parish-church of Penicuik, N.B., is for the present postponed in consequence of the interference by the proposed works with the graves of recently interred persons.

The Duke of Norfolk—who appears to have objected to being described in the summons as a "coal-miner," was summoned at Sheffield last week by three bricklayers for damages for wrongful dismissal. The magistrate advised the payment of compensation.

A new temporary church was opened on Thursday week, at Radstock.

A triangular plot of land in Manchester, bounded by Victoria-street, Deansgate, and St. Mary's-gate, has been purchased from the corporation for the sum of £288,960, being at the rate of £56 per yard.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHELVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB AND SONS,  
Makers to the Bank of England,  
57, S. Paul's Church-yard, E.C.  
And 68, S. James' street, S.W.—[ADVT.] } London.

## Trade News.

## WAGES MOVEMENT.

**ELGIN.**—The building trades of Elgin are very slack scarcely a house being in course of erection. A proposal has been mooted for the establishment of a Joint Stock Company.

**LLANBERIS.**—Another strike is threatened at Mr. Assheton-Smith's slate quarries, Llanberis, 3,000 men having taken offence at the dismissal of one of their number.

**MANCHESTER.**—The carpenters and joiners of the Manchester and Salford district, at a mass meeting on Monday night, determined to give notice to their employers that from May next they would require to be paid 1d. extra, or 9d. per hour, and that during the summer months the hours of labour should be 50 in stead of 54.

## The Timber Trade.

The following are the wholesale prices of timber, deals, &c. :—

	Per superficial foot.			
	s.	d.	s.	d.
Cuba cedar	0	4½	0	5
Honduras cedar	0	3½	0	4½
Pencil	0	2	0	3½
Australian	0	3½	0	4½
Bird's-eye maple	0	5	0	7
Italian walnut	0	4½	0	5
Black sea	0	3½	0	4
Canadian	0	3	0	4
Honduras mahogany, cargo avge.	0	4	0	5½
Mexican	0	4½	0	5½
Tabasco	0	5	0	6
Cuba	0	6½	0	10
St. Domingo	0	7	0	10
"	1	0	2	0
"	Per ton.			
	£	s.	£	s.
Bahama satinwood	7	0	9	0
East India	8	0	10	0
Rio rosewood	14	0	20	0
Bahia	12	0	18	0
Puerto Caballo zebra wood	7	0	8	0
Ceylon ebony	12	0	18	0
African billet	12	0	15	0
Lignum Vitæ	6	0	10	0
Cuba cocowood	5	0	7	0
Turkey boxwood	5	0	16	0

Per cubic load.

	s.	d.	s.	d.
Quebec red pine, building	70	0	80	0
" yards and spars	90	0	130	0
" yellow pine, large	110	0	130	0
" waney board	110	0	130	0
" small	80	0	90	0
" birch, large	110	0		
" oak	140	0	160	0
" rock elm	120	0		
" ash	140	0		
Pitch pine	75	0	85	0
Red Pine masts	90	0	120	0
Yellow Pine masts	80	0	130	0
Oregon	180	0	240	0
Kawrie	160	0	220	0
Norway spars	40	0	60	0
Riga fir	80	0	85	0
Baltic crown fir	90	0		
" best middling	80	0	90	0
" good middling	70	0	80	0
" common middling	55	0	65	0
" undersized	55	0	60	0
" small and short	50	0	60	0
Stettin	60	0	70	0
Swedish	60	0	65	0
" small	50	0	58	0
" balks	40	0	58	0
Memel crown oak	110	0	160	0
" brack	105	0		
Dantzic crown	110	0	160	0
Indian teak	220	0	280	0
Greenheart	250	0	270	0
Australian ironbark	170	0	220	0

At each.

	s.	d.	s.	d.
Lancewood spars	6	0	9	0
Norway Rickers	0	6	0	8

Per foot run.

	0	1½	0	2
Norway poles				

Per 18ft. cube.

	110	0	120	0
Riga crown wainscot				
" brack	95	0	100	0
Memel crown	95	0	110	0
" brack	75	0	85	0

Per mille of pipe.

	£	s.	£	s.
Memel crown pipe staves	250	0	270	0
" brack	200	0	220	0
Dantzic, &c.	200	0		
Quebec, standard pipe	75	0	80	0
" puncheon per 1200 pieces	17	0	19	0
Bosnia, single barrel per do.	31	10		
U. S. pipe.	50	0	72	10
" hhd. heavy and extra	30	0	45	0
" " slight	18	0	21	0

Per square of lin.

	s.	d.	s.	d.
Best yellow, flooring	14	6	17	6
" white	13	6	14	6
Second qualities	12	0	15	0

Per cubic fathom.

	£	s.	£	s.
Petersburg lathwood	9	0	9	10
Riga, &c.	7	0		
Swedish firewood	5	5	5	10
Norway	3	10	4	10

Per 120 12ft. 1½ by 11.

	4	by	12	14	0
Ceife, 3rd yellow					
"	3	by	9	14	0
"	4	by	9	13	15
"	3	by	9	15	10
Petersburg, 1st yellow	2	by	7	14	0
"	3	by	11	13	0
" 2nd	3	by	9	13	10
"	3	by	9	11	10
" 1st white	3	by	9	10	10
" 2nd	3	by	9	10	10
"	3	by	11	10	10



		£	s.	£	s.
Archangel, 1st yellow	.	.	16	10	17 10
" 2nd "	.	.	13	0	14 0
Wyburg, 1st "	.	.	13	10	15 10
Pitch pine	.	.	14	0	15 10
Quebec, 1st spruce	.	.	10	15	12 0
" 2nd "	.	.	10	0	10 5
" 3rd "	.	.	9	10	
Quebec, 1st bright pine	.	.	21	0	24 0
" 1st floated "	.	.	20	0	
" 2nd bright "	.	.	13	0	14 0
" 2nd floated "	.	.	14	0	
" 3rd bright "	.	.	11	0	12 0
" 3rd floated "	.	.	12	0	
St. John's spruce	.	.	8	0	10 0
Gothenburg, 2nd yellow, battens	.	.	10	0	
Jacobstadt 1st yellow	.	.	12	10	13 10
" 1st white	3 by 11	.	11	10	
" "	3 by 9	.	10	10	
" "	battens	.	9	10	
Sundswall, com. yellow	3 by 11	.	10	10	
" "	3 by 9	.	10	10	
Pitea, 2nd yellow	2½ by 7	.	11	10	
Soderhamn, 1 & 2 yellow	.	.	13	0	14 0
" 3rd "	.	.	12	10	13 10

**THE AMERICAN TIMBER MARKET.**—According to the *Boston Timber Trade* the state of the timber market in that city is very dull. Timber comes forward in quantities that exceed the demand. In New York the conditions of things is similar, and the only remedy is affirmed to be "a reduction of the producing capacity throughout the country. At Albany an increased trade is looked for, and prices generally are steady. At Chicago, the recent improvement in the market continues; the late fire has created an active demand for joists, and the abundant harvest has placed farmers in a position to make improvements. At Pensacola there is a marked change for the better, and freights are more in demand. At St. John's, New Brunswick, the freight market continues very quiet.

### WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay. For samples and further particulars, apply to the **MANAGER**, at the Quarries Narberth-road, R.S.O.—[ADVT.]

### TENDERS.

**ABBEY MILLS.**—For cleansing cold water reservoirs at Abbey Mills Pumping Station three times a year, for the Metropolitan Board of Works. Sir J. W. Bazalgette, engineer.

	1 year	3 years.
Williams.....	£259 0 0	
Pearson.....	252 0 0	£720 0 0
Knight.....	250 0 0	720 0 0

\* Accepted for one year.

**BARKING.**—For two houses, Barking-road. Mr. Jno. W. Morris, architect, Poplar.

Emor.....	£1,538 0 0
Abraham.....	1,494 0 0
Bates and Ramage.....	1,465 0 0
Lunn.....	1,440 0 0
Watts.....	1,775 0 0
Tanner.....	1,361 0 0
Bangs.....	1,356 0 0
Atherton and Latta.....	1,350 0 0
Sheffield (accepted).....	1,344 0 0

**BARNES.**—For villa residence at Barnes Common, for Mr. James Leaver. Mr. E. F. Roberts, architect, Hammersmith, Quantities supplied by Messrs. Strudwick and Mennie.

#### For General Work.

King and Son.....	£1,543 0 0
Avis and Co.....	1,530 0 0
Adamson and Sons.....	1,497 0 0
Scrivenner and White.....	1,445 0 0
Temple and Foster.....	1,445 0 0
Aitchison and Walker.....	1,425 0 0
Downs.....	1,287 0 0

#### For Concrete and External Cement Work.

Economic Concrete Company.....	650 0 0
Foster.....	458 0 0

**BROMLEY.**—For the erection of a school to accommodate 753 children on the site in High-street, Bromley, for the London School Board. Mr. E. R. Robson, architect.

Wall Bros.....	£6,993 0 0
Wood.....	6,920 0 0
Williams and Son.....	6,867 0 0
Atherton and Latta.....	6,800 0 0
Kilroy.....	6,565 0 0
Prichard.....	6,535 0 0
Sheffield.....	6,456 0 0
Nightingale (accepted).....	6,287 0 0

**DORKING.**—For a house on the Holloway Estate. Mr. John Sulman, architect.

Roberts Bros.....	£1,847 0 0
Goddard.....	1,695 0 0
Collis and Son.....	1,694 0 0
Waterson.....	1,695 0 0
Putney (accepted with additions).....	1,620 0 0

**EVESHAM.**—For new Episcopal and Nonconformist Chapels, keeper's lodge, and boundary walls, at Evesham Cemetery. Messrs. Lunn and Sansome, architects. Quantities supplied.

Smith.....	£1,919 0 0
Hawkins.....	1,680 0 0
Espley (accepted).....	1,450 0 0
Gardner.....	1,448 5 0
Walford.....	1,440 0 0
Foster.....	1,368 10 0

**HIGHGATE.**—For works in the erection of additional laundry buildings, &c., at the Central London Sick Asylum, Highgate. Messrs. J. Giles and Gough, architects. Quantities by Mr. Charles H. Goode.

Seed.....	£6,669 0 0
Lovell.....	5,627 0 0
Turnwell.....	5,487 0 0
Rankin.....	5,160 0 0
Niblett and Son.....	4,990 0 0
Rangs and Co.....	4,954 0 0
Staines and Son.....	4,896 0 0
Crockett.....	4,857 0 0
Nightingale.....	4,654 0 0

	Chapels.	Lodge A.	Lodge B.	Gates.	Total.
Sheffield.....	£8,060 0 0	£816 0 0	£569 0 0	£426 0 0	£9,871 0 0
Williams & Son.....	6,762 0 0	82 0 0	581 0 0	439 0 0	8,604 0 0
Niblett & Son.....	6,361 0 0	739 0 0	523 0 0	430 0 0	8,253 0 0
Bowyer & Son.....	6,338 0 0	769 0 0	562 0 0	482 0 0	8,131 0 0
Dove Bros.....	5,995 0 0	905 0 0	615 0 0	460 0 0	8,025 0 0
Lord.....	5,850 17 0	776 10	739 17	0 490 0	7,917 4 0
Unwin.....	5,642 7 8	867 0	739 11	6 482 4	7,792 6 10
Wilson Bros.....	5,610 0 0	732 0	439 0	0 438 0	7,279 0 0

**KELLY COLLEGE, TAVISTOCK, DEVON.**—For the erection of the first portion of College, No. 1: head master's house, No. 2; and for external works, No. 3. Quantities supplied. Mr. Chas. F. Hanson, architect, Clifton.

	No. 1.	No. 2.	No. 3.	Total.
Marshall and Son.....	£10,458...	£13,618...	£891...	£24,967
MacMillan.....	8,803...	12,340...	914...	22,037
Matcham.....	8,327...	12,171...	951...	21,449
Hubbard and Co.....	8,316...	11,598...	771...	20,675
Trevena.....	8,475...	11,123...	828...	20,421
Blatchford and Son.....	8,489...	10,170...	610...	18,896
Finch.....	7,765...	10,540...	585...	18,890
Pethick (accepted).....	7,356...	10,244...	870...	18,470
Architect's estimate.....	8,000...	10,500...	750...	19,250

**LONDON.**—For alterations, repairs, and decorative work at No. 14, Charlotte-street, Bedford square, for Mr. E. Weigner. Mr. Frederick E. Hayes, architect.

Condon.....	£760 0 0
Bates and Ramage.....	630 0 0
Toms (accepted).....	460 0 0

**LONDON.**—For two shops and dwelling houses, Oxford-street, corner of George-street, for Mr. Wm. Adkins. Mr. F. Boreham, architect.

Hill, Higgs, and Co.....	£7,540 0 0
McLachlan.....	7,470 0 0
Roberts.....	6,998 0 0
Scrivenner and White.....	6,688 0 0
Lister.....	6,597 0 0
Macey (accepted).....	6,456 0 0

**LONDON.**—For alterations to shop front and fittings, &c. Messrs. Ebbetts and Cobb, architects.

Hyde.....	£256 0 0
Steel.....	243 5 0
Perkins.....	239 0 0
Aitchison and Walker (accepted).....	190 0 0

**MIDDLESEX.**—For warehouse, stables, and cottage at Willesden Green Farm, near London, for All Souls College, Oxford. Mr. Robt. Hutchinson, architect, Huntingdon.

Perry.....	£3,722 0 0
Harrison.....	3,271 0 0
Crook.....	3,200 0 0
Blott.....	3,160 0 0
Keys.....	3,014 0 0
Windows.....	3,006 10 3
Johnson.....	3,003 0 0
Thomas.....	2,905 0 0
Gould and Brand.....	2,876 0 0
Parsons.....	2,845 0 0
Hook and Oldrey.....	2,824 16 0
Simpson and Baker.....	2,811 0 0
Harpies.....	2,799 0 0
Snell.....	2,774 0 0
Smith and Allen.....	2,665 0 0
Handover.....	2,560 0 0
Groome.....	2,160 0 0
Iles.....	1,785 0 0

**SOUTHWARK.**—For various alterations at Southwark Park, for the Metropolitan Board of Works.

Meston.....	£6,280 0 0
Meston (amended tender, accepted).....	5,357 7 3

**TIPTON.**—For additions to school at Dudley Port, for the Tipton School Board. Messrs. Charles Round and Henry Beddoe, architects.

	1st Con.	2nd Con.	3rd Con.	Total.
Nicklin.....	£2,794...	£648...	£46...	£3,488
Holland and Sons.....	2,370...	725...	31...	3,126
Jones.....	2,282...	706...	30...	3,018
Nelson.....	2,126...	674...	26...	2,826
Tranter.....	2,027...	657...	24...	2,728
Stockton and Son.....	1,844...	556...	26...	2,426
Haffner.....	2,100...	709...	25...	2,825

\* Accepted.

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ISLE OF PORTLAND, DORSET.  
London Depots at South Western and Great Western Railways.

**COMPETITIONS OPEN.**  
**CANNOCK SCHOOL BOARD, Nov. 4.**—For plans, specifications, and estimates for erecting two Board Schools, each to accommodate 300 children. Mr. W. Freeman, Clerk to the Board, Wolverhampton-road, Cannock.  
**ROCHESTER, Dec. 5.**—For designs for houses proposed to be built on the City Garden Estate. Premiums of £30 for the best, £20 for the second, and £10 for the third best designs. R. Prall, Town Clerk, Town Clerk's Offices Rochester.

**Geometrical and Encaustic Tile Pavements**  
in every variety. Over Sixty New Designs at 6s. 6d. per yard super. "The Tiles are excellent, both in quality and colour."—*BUILDING NEWS*. "They are of great excellence in design—the material is not surpassed by any found in this kingdom."—*Art Journal*. "The patterns are remarkably good and effective."—*Gardener's Magazine*, &c., &c. Designs and sample Tiles free on application to **HENRY C. WEBB**, Tiles, Worcester. London House, 114, Victoria-street, Westminster. Mr. T. Pulling, Agent.—[ADVT.]

### CONTRACTS OPEN FOR BUILDING ESTIMATES.

**BRADFORD TRAMWAY CO., Nov. 11.**—For constructing a line of tramway along Manningham-lane. Mr. J. Kincaid, C.E., 49, Cannon-street, E.C.

**BRIKTHORP RURAL SANITARY AUTHORITY, Nov. 2.**—For constructing sewerage works. Mr. A. J. Jeffery, 1, Market-square, Northampton.

**BURTON-ON-TRENT DISTRICT SCHOOL BOARD, Nov. 2.**—For the erection of a school in Anderstall-lane; also for schools, board-room, offices, and keeper's house in Guild-street, Messrs. Giles and Brookhouse, architects, 9, St. James's-street, Derby.

**COPOCK, Nov. 9.**—For the erection of school and teacher's residence. Messrs. Barnes and Bisshopp, architects, 13, Lower Brook-street, Ipswich.

**GREAT YARMOUTH, Nov. 8.**—For new hot water and steam apparatus, boiler, &c., at Workhouse. Mr. F. Whitmore, architect, Chelmsford.

**GREAT WESTERN RAILWAY, Nov. 4.**—For the purchase of about 1,800 tons of old iron rails. Storekeeper, Swindon Station.

**INDIA OFFICE, Nov. 2.**—For supplying sheet iron, G. C. Talbot, Director-General of Stores, India Office, Westminster, S.W.

**LAMBETH, Nov. 2.**—For the erection of a mortuary and dead house. Mr. H. McIntosh, Surveyor, Vestry Hall, Kenning-on-green.

**LAMBETH SCHOOLS, Nov. 3.**—For alterations to the infant's school at Lower Norwood. Mr. G. Nixon, 12, Dartmouth-street, Westminster, S.W.

**LONG BENTON, Nov. 10.**—For the erection of schools at Walker. Mr. Lamb, architect, Town Hall, Newcastle-upon-Tyne.

**LONDON AND NORTH WESTERN RAILWAY, Nov. 3.**—For the supply of steel rails, chairs, fish-plates, bolts, spikes and other materials. Mr. R. E. Johnston, Engineer, Monk's Ferry, Birkenhead.

**LONDON AND SOUTH WESTERN RAILWAY, Nov. 5.**—For the purchase of old copper, gun metal, tubes, steel, &c. Company's Storekeeper, Nine Elms station.

**MIDLAND RAILWAY, Nov. 3.**—For constructing and erecting an iron roof, &c., to the saw-mills, for the carriage department, at Derby. Engineer's Office, Derby Station.

**MIDLAND RAILWAY, Nov. 3.**—For the supply of 500 goods waggon. Carriage and Waggon Superintendent's Office, Derby.

**MIDLAND RAILWAY, Nov. 3.**—For the erection of goods warehouse, station buildings, and station-master's house, at Berkeley Junction. Engineer's Office, Gloucester.

**NORTHALLERTON, Nov. 5.**—For the erection of a villa at Ainderby Steeple. Messrs. Atkinson, architects, 22, Micklegate, York.

**NORTH EASTERN RAILWAY, Nov. 7.**—For constructing the Monkwearmouth and Sunderland Railways. Engineer's Office, Newcastle-on-Tyne.

**TOTTENHAM, Nov. 3.**—For the supply and erection of a new pump, and other works at the Waterworks, Tottenham Hall. Mr. J. A. Clements, surveyor, Coombes Croft House, High-road, Tottenham.

**EPPE'S COCOA.—GRATEFUL AND COMFORTING.**—"By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected cocoa, Mr. Eppe has provided our breakfast-table with a delicious and nourishing beverage, which may save us many heavy doctors' bills."—*Civil Service Gazette*. "Made simply with boiling Water or Milk. Each packet is labelled—"JAMES EPPE and Co., Homoeopathic Chemists, London."—[ADVT.]

**Lamplough's Pyretic Saline** is refreshing, most agreeable, and the preventive of fevers, biliousness, small-pox, skin diseases, and many other spring and summer ailments. Sold by chemists throughout the world, and the Maker, 113, Holborn Hill. Use no substitute.—[ADVT.]

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## THE BUILDING NEWS.

LONDON, FRIDAY, NOVEMBER 6, 1874.

## PLANTS, AND THEIR ORNAMENTAL TREATMENT.\*

(FIRST ARTICLE.)

**P**LANT-FORM has been a prolific source of suggestion to the artist of every age. The Egyptian, Assyrian, and Greek artists found abundant material in the vegetable kingdom for their ornamental design; the papyrus, lotus or water-lily of the Nile, the honeysuckle, and the acanthus-leaf were the types of the most beautiful ornamentation. The Mediæval artist to a still larger extent borrowed natural forms, as the oak, vine, maple, trefoil, ivy, stonecrop, nettle, holly, and fungus, which were in a thousand ways transmuted and appropriated by the carver into capitals, arch-moulds, bosses, and borders that for simplicity and elegance cannot be surpassed. And a deeper significance than the æsthetic was hidden under these adaptations; they were frequently symbolic also. Thus, the Lotus of the Egyptians symbolised Plenty; while the Vine was in allusion to the "True Vine;" the Lily meant "spotlessness;" and the Palm "Victory." But to the artist, deep and poetical as the inner meaning of plants may be, they possess a nobler power derivable from the abstract beauty of their endless forms and structure. Apart from their symbolic teaching, which springs from association, they appeal to the broader sympathies and emotions of man: they teach us that Nature works by exact laws; that her molecular forces are not capricious, but develop symmetric forms, as regular and beautiful as any geometry could devise.

Mr. F. Edward Hulme, in the work which has suggested these remarks, opens to the ornamentist and architect a rich store of examples culled from the world of plants; and although we have already a few works that are able exponents of the subject—those, for instance, of Mr. Griffiths and Mr. J. K. Colling—there is room for further illustration of this exhaustless treasure-house of Nature. Mr. Hulme's treatment of the subject is somewhat different from that of his predecessors in this field. His work, which is beautifully illustrated by 44 chromo-lithographs of natural plants and their conventional treatment, occupies a place between the descriptive works of botanical science and the decorative application of plant-form so ably discussed in the works of Owen Jones, Dresser, Wornum, Colling, and others. It will be an admirable introduction to the latter works, as it presents the student with a clear analysis of the leading peculiarities of plants, their natural growth, and emblematic, heraldic, and legendary associations, which those works do not supply; while it just indicates, in an easy and judicious manner, the ornamental capabilities of each plant—how its stem, leaves, and flowers may be applied to the purpose of ornament. In this manner it becomes a convenient textbook to the student and ornamentist, giving so much of botanical science and its nomenclature as will intelligibly furnish the designer with a basis for his study; while, by giving rather the process of application than multiplicity of worked-out examples, it will serve better to encourage invention and ingenuity of adaptation. We believe there is more good done in indicating the elements or the process of design in these cases than by giving set forms of design, which appear to us, as a rule, to cramp and restrain, rather than develop, the faculty of the designer. Indeed, we think

the author of this work, good as it is, has hardly gone far enough in this direction. If to the botanical descriptions of each plate he had added the application, or principles of adaptation, in a concise paragraph, instead of casually introducing it into the text, he would have made the work more practically available.

Let us here introduce our readers to a few of the choice specimens of plant-form in Mr. Hulme's book. One word here. In introducing the subject, the author refers to the lack of interest in the study of plants, and the hindrance which the commonly-received idea of the technicality and difficulty of learning botany is with many. The terms of botanical description deter many from a study which is co-extensive with Nature. The author says a "very slight expenditure of time and trouble" is required by the designer in understanding the commoner terms of botany; and, when once this knowledge is obtained, the student is more than compensated for his trouble by the great facility the scientific term gives him of comprehending in all its fulness the meaning of a particular part or peculiarity of growth which can hardly be conveyed by a circumlocution of common words. One hint we would throw out which the author might take advantage of in a subsequent edition, and that is, to define, by aid of diagrams, a few of the more constantly recurring terms of structure and growth, as "ovate-lanceolate," "umbellate," "paniculate," "corymbose," &c., for the use of students—in the same manner as we see in "Ray's Alphabet of Botany" and other elementary manuals. Such a glossary would save repetition, and mixing definitions with the text.

There are some very valuable distinctions which the designer should constantly keep in mind in arranging his designs of plant-form, and these have relation to the manner in which the leaves are joined to the stem; whether singly, as in the water-cress and oak, or in pairs, as in the ground-ivy; how they alternate with one another; whether they grow out at different positions round the stem, or spirally, or are placed all in one place; what angles they form with the stem, and so on. Some of the most marked variations of growth, and the most useful for the designer to be acquainted with, are given. For instance, as regards the *leaf*, the following points of interest should be carefully observed:—1. Its position on the stem. 2. Its general form as a mass. 3. Character of outline. 4. The venation, or disposition of the leaf veins. 5. The texture. Then again, a leaf may be stalked, as that of the apple; or stalkless, as in the pimpernel; it may surround the stem as in the perfoliate honeysuckle, or it may be decurrent or continued down the sides of the stem as in some thistles. Leaves when they occur at intervals, and singly often grow in a spiral; such is the case with the oak, where each leaf forms an angle with its adjacent one, and five leaves complete one revolution round the stem. In the meadow saffron three leaves make one revolution; whereas, in the ivy (*Hedera helix*) the third leaf comes over the first. When leaves grow in pairs, the pairs sometimes alternate, the second pair being at right angles to the first; in others, as in the pond-weed, they are over one another; in others the successive pairs are ranged spirally. In the pines and firs the leaves are in bundles (*fasciculus*). In the American water-weed (*Anacharis alsinastrium*) the leaves are whorled, composed of three, four, or more parts. It is a universal law that, the greater the number of parts, the less regular they are, the simple opposite or two-leaved arrangements being most regular, while in the goose-grass the whorls vary in the number of their leaves. Of leaf-form there is an exhaustless variety; those leaves whose divisions do not extend to the rib or leaf stem are *simple*; while others, where the division extends, are *compound*. Of the latter kind, also, two distinct types prevail—one where the

parts *radiate*, as in the horse-chestnut leaf; the other, where the parts are thrown off at intervals, as in the ash, called *pinnate* leaves, from their resemblance to a feather. The divisions or leaflets also may be of varying or of equal size. Decomound leaves are those in which the divisions are numerous and complex, and a still greater subdivision, as in the hemlock, is known as *supra-decomound*. Among the leaves given as examples of the form and subdivision suitable to the ornamentist, is the sycamore (*Acer pseudo-platanus*) in which the radiating form is observed, and the five lobes are of varying proportions, and of an outline that has doubtless suggested to the artist many forms of architectural character, as the cinquefoil. Another ornate form is the leaf of the pelargonium, also radiate, the outline of the mass being circular, and composed of similarly-shaped lobes. Of quite a different class are leaves of the lanceolate kind (from resemblance to a lance head) as in the evening primrose (*Oenothera biennis*). Others are oval *spatulate*, or battle-dore-shaped, as in the daisy and London pride; hastate or dart-shaped, as in the corn convolvulus; cordate, or heart-shaped, as in that of the black bryony (*Tamus communis*); sagittate, or arrow-shaped, as in the arrowhead (*Sagittaria sagittifolia*); or peltate (or shield-like) as in the nasturtium, where the stem seems to pierce the leaf, its attachment being at some distance from the margin. Another peculiarity the artist should study, and that is the manner the central line of leaf terminates. Generally it does so in a point, though sometimes there is a depressed appearance at its end, as in the box, and in other cases the leaf is actually divided at its extremity, and is then known as *bifid*, as in the leaf of the ginkgo. This peculiarity may be made a marked ornamental feature. The venation of leaves is important to the ornamentist. The oak (*Quercus robur*) and the vine leaf (*Vitis vinifera*) illustrate two great distinctions. In the first the veins or leaf ribs are nearly parallel, and thrown off at intervals along the centre; it is then called "penninerved;" in the vine-leaf the veins or ribs are radiate from the base of the centre rib like a hand, and is then known as "palminerved."

Taking a few of the leaf types, Mr. Hulme says the sycamore has rarely, if ever, been applied in decorative art, "though the maple (*Acer campestre*), an allied species, was one of the greatest favourites of the carvers during the Decorated period of Gothic." The pelargonium or geranium leaf is highly suggestive also; so is the corn convolvulus, or small bindweed, a common hedge-row plant, also seen entwined round the stalks of growing corn, and exceedingly adapted, as the author remarks, for a light class of design. A stall in Wells Cathedral is decorated with it, and it would be well adapted for wrought-iron foliation. The leaf of the coltsfoot, called also coughwort, is a highly ornamental form, though Mr. Hulme says he is unable to cite any instance of its application. From its simple and angular outline, it is well adapted to stone carving. The black bryony, a common plant of our hedges, with its trailing stems, its red berries, and large cordate or heart-like leaves, is also a plant particularly suggestive to the designer. The knapweed (*Centaurea scabiosa*) has a leaf of a compound form, and very ornamental. The corn marigold is another leaf well adapted for ornamental purposes, and for the same reasons we may name the leaves of the ivy-leaved speedwell (*Veronica hederifolia*) which exhibit a remarkable variation during growth. Outlines of leaves are variously indented, called "entire," "serrate," "dentate," "crenate," "serrulate," "erose," as they are respectively of one unbroken line, with teeth pointed towards apex, with teeth perpendicular to the outline, rounded teeth, small saw teeth, and irregularly formed. Among the characteristics of leaf form we may notice the surface of leaves: some are flat, others have their margins waved, or their

\* "Plants: Their Natural Growth and Ornamental Treatment." By F. EDWARD HULME, F.L.S., F.S.A., &c. London: Marcus Ward & Co. 1874.



surfaces between the veins wrinkled or convex. These are peculiarities which are very valuable to the decorative artist, as flat leaves are of course more adapted for flat representation, while in carving, a crisped or wrinkled leaf like that of the holly enables the carver to vary his work, and give an effect of light and shadow of much value in relief work. Such leaves are the wood-sage and the colts-foot. Though leaves are generally symmetrical, they are not invariably so. In some cases the portions on each side of the middle rib are of different size. Leaves that show an unsymmetrical disposition are generally alternately placed on the stem. De Candolle says "this inequality ought to be referred to the position of the leaf upon the plant favouring the development of one of its sides more than the other, and in this case it is always the lowest which is developed most."

#### RECENT INVESTIGATIONS INTO SOME OF THE PROPERTIES OF MATERIALS.

A NEW testing machine, with autographic registry, has been applied by Professor R. H. Thurston to interpret or record various mechanical properties of materials; and the results of the investigations conducted with this instrument are of sufficient interest to prompt us to allude to them. They have been published in the *Transactions of the American Society of Civil Engineers*. The homogeneity of material, the elastic resistance, ultimate resistance, resilience, effects of loads or blows on materials, distortion, and other phenomena, are recorded on the autographic diagram; and any variation indicates the existence of and measures the amount of strain, homogeneity, or other qualities of the material under test. In other cases—as in determining the effects of loads, blows, or shocks—it is only necessary to find certain points in the curves having ordinates which represent the stress and extension of the material under the assumed conditions. But we will not here describe the apparatus, but give some of the more useful results recorded. Metals left under strain for a considerable time are known to have been weakened in their resistance, and the experiments of M. Vicat, on four wires, three of which were strained beyond their elastic limits, and were found, at intervals of a year, to have elongated, seem to confirm this view. This view, not unnaturally, has caused some uneasiness among engineers and others, as to the failure of their structures, which originally had an ample margin of safety.

The researches of Professor Thurston, in this direction, appear to make it very doubtful whether materials are really weakened by a continuance of any stress, if not, indeed, to show an opposite tendency. A series of experiments, conducted for the American Society, on iron of various grades and steel, showed in the machine an increase of the resisting power under the continued strain, "the pencil, instead of following the general direction taken the day previous, rose until a resistance was indicated exceeding by nearly 30 per cent. that shown before the specimen was left under strain." A piece of "Siemens-Martin" steel was left under strain 24 hours, and on renewing the strain the resistance seemed to have acquired an increased intensity even greater than under its previous treatment. A loss of ductility sometimes accompanies the increase of resistance. Reviewing the experiments made on the effect of continued strain, and after comparing the curves and the results of Kirkaldy and other investigators, the following conclusion is arrived at:—"The phenomenon here discovered is an elevation of the limit of elasticity by a continued strain. The cause is probably a gradual release of internal strain, occurring in a somewhat similar manner to that observed in cast-iron in large masses, and less frequently, and generally in a less marked degree, in wrought-iron and other metals which have

been worked in large pieces, and in which such strain has been more or less reduced by a period of rest." The rationale of this reduction in the internal strain by continued stress at the limit of elasticity is explained as follows:—"When the metal is strained the sets of molecules are in positions in which they exert a maximum effect tending to produce molecular changes which may equalise the originally irregular distribution of intermolecular stress. After a time, the change takes place by 'flow,' and the resisting power of the piece becomes increased, and its limit of elasticity raised, simply because its forces are now no longer divided, and may act together in resisting external forces."

This important investigation into the molecular condition of iron under stress has been independently pursued by Commander Beardslee, U.S.N., who found metal, strained in tension beyond the elastic limits, gain in resistance at a position of earliest set. The registration of the ductility appears also to show that resilience does not increase in the same proportion. So far, then, Vicat's conclusions seem to be contradicted; at least, these experiments have not confirmed them, and we are now told that metal structures are not weakened with age except by corrosion and other external causes. It is true we have the deductions of Kirkaldy also, whose tables show bars which have been longest under strain to have greater resistance; and he also asserts that additional time occupied in testing certain specimens "had no injurious effect in lessening the amount of breaking strain." Professor Thurston's investigations show that a material offers a lower resistance when the strain is rapidly applied, the molecules not having time to rearrange themselves and relieve the internal strain, as is supposed under a continued stress, when their movement, or "flow," is brought into action. This, indeed, indicates that shock and sudden applications of load, as railway trains, should be important considerations in determining the resisting power of materials. The loss of the resistance due to sudden shocks is computed at about 15 per cent. Experiments have not enabled us to apply a mathematical determination of the factor of safety to adopt in cases of this kind, and the builder and engineer should, therefore, in designing structures subject to shocks and live loads use the most ductile materials, and give them forms capable of spreading any shock or strain over other parts of the structure.

The elasticity of metals has, by the same experimenter, been found to contradict some generally received hypotheses. It has been hitherto entertained that straining metal might weaken it, but the experiments show that elasticity is not affected by strain, and that cohesion remains unimpaired, indeed, increased, up to the point at which incipient fracture occurs.

Variation of temperature has an important effect upon materials. The result of the investigation is, "that iron and other metals do not lose their power of sustaining 'dead' loads at low temperature, but that they lose to a serious extent their power of resisting sharp blows;" that for dead loads the factors of safety need not be increased, but that construction to resist shocks should be carefully protected from extreme temperatures, and should have larger factors of safety. At very high temperatures heat energy tends to separate the particles, and the general effect of increase or decrease of temperature is to diminish or increase the powers of resistance respectively. It has been found that above 600° and below 70° the tenacity of iron increases with diminishing temperature below the latter point, while its resilience decreases in a higher ratio for good iron. The investigations of Coulomb, Henry, Powell, Faraday, Rankine, Fairbairn, Joule, Kirkaldy, and others, have aided in establishing these results; and the discrepancy of the supposition that reduced temperature weakened the metal, may have

arisen from the manner of testing, namely, by sudden blows; for these experiments show that change of temperature produces changes of ductility the reverse of those produced in tenacity, and that a bar might show great resistance to static stress, and yet not be able to resist shock.

#### HISTORIC ART STUDIES.

SCULPTURES OF THE GERMAN SCHOOL, NINETEENTH CENTURY.

(With Double-page Illustration.)

WE shall always uphold the principle that "a good copy is better than a bad original" in art. The Walhalla, near Ratisbon, is merely a copy of the Parthenon; it harmonises as little with the surrounding high roofs of German villages as do our Gothic Houses of Parliament with the surrounding Renaissance Government Offices, or St. Paul's with massive warehouses filled with cotton goods, silks, Dresden China, and French bronze works. The Walhalla has, however, its merits. German Sagas and Greek myths are not only not contradictory, but strikingly analogous. Achilles fighting for the glory of the Greeks is a heroic figure of grand and simple manliness, like Arnim, or Hermann, the Cheruskan chief, slaying the pompous Romans to free Germany from the intolerable despotism of a foreign tyrant. The Greeks, at the period when Homer's songs recorded their deeds, were in a state like that of the Germans when they vanquished the enervated Romans. The Walhalla, dedicated to glorify the master minds and heroes of Germany, could not be constructed in a better form than that of the Parthenon, which was to the Greek what the abode of bliss, fame, and eternal glory is to the German. Our old Post Office, our British Museum, and our Royal Exchange are constructed in the Greek style, and, if we were superciliously scrupulous, or altogether ignorant of art, we might really say that these buildings look "like Minerva descending in Cheapside to separate two quarrelling cabmen." Nothing could be more appropriate for a temple of fame than a correct copy of the Parthenon, adorned with reliefs uniting the deeds of Teutons, Pelasgians, Hellenes, and Trojans. Leo von Klenze, the architect, influenced, like Schinkel, by an assiduous study of Stuart and Revett, devoted himself entirely to the Antique—a tendency undoubtedly more in the spirit of the nineteenth century than any revivalism of Mediæval products. Klenze, with his South German nature, was far from understanding the pure, genial, and grand designs of Greece, and kept more to a correct reproduction of them; but such reproductions, at least, promote a better taste than so-called originals, conceived in a spirit out of date, and void of symmetry. Schinkel brought originality to bear on his studies of the Antique; he was Greek in symmetry and proportion, but he was modern in his grand plans, and less conventional than Klenze, who stood in the same relation to the master architect of Berlin as Schwanthaler (b. 1802, d. 1848) to the sculptors of the North.

Men's minds in Munich were bent on colours, on symbolism, on a mighty revival of the old Germano-Christian spirit of Romanticism, in opposition to the Græco-heathenish tendencies of the Classicists. An analogous movement took place with some of our architects, but they had no leader like Cornelius, and no opponent like Schwanthaler. Shakespeare, Goethe, the Nibelungen Song, the Old and New Testament, Albert Dürer, and the Italian school of painters of the sixteenth century formed the studies of the Romanticists; whilst the Classicists worshipped Homer, read Sophocles, and studied the mythology of the Greeks personifying the forces of nature. Both agreed on one point, that architecture, sculpture, and painting



should be used with deep and humble veneration to record events of Religion, History, and Poetry, so as to raise the standard of art, and to elevate the national taste. This explains the fact that, after all, they intermingled their subjects; the artists who worked in colours did not altogether refuse to paint mythological scenes, whilst the sculptors sometimes devoted their talents to the reproduction of sacred subjects. The Germans did not look on the mythology of the Greeks as the mere outgrowth of a merry and lively imagination, as did the artists of the Renaissance; but, in accordance with the spirit of modern philosophy, they saw in those variegated forms the embodiments of deep religious truths prevailing everything. The many gods, their deeds and fates, were personified qualities of the Most High, the Eternal One; they were but emanations of his manifold power in the Universe. These lofty thoughts brought a new life into Art through a closer artistic union between the refined external world of the Classics, and the emotional internal feelings of the Romanticists. The Zeus of Phidias and the Jehovah of Michael Angelo, were blended into one ruler in the realms of Art and Beauty. The spirit of Christianity was revived, not in broad-brimmed hats, in imitations of baldachins, or screens, in "Eastern postures," candlesticks, and lecterns, but in mighty works of art, tangibly recording the triumph of the idea over the form, of spirit over flesh, of beauty over ugliness, of good over evil. An entirely new world has grown into reality amongst our Teuton brethren during this century, not only in sciences, but also in art; and it is surprising to find how little we know of them, how much we need an æsthetic seer, like Carlyle, who first made us acquainted with the genius of German literature, to impress upon us the fact that there are artists on the Iser, the Danube, the Spree, and the Rhine. If we study the mighty figures by Schwanthaler (see Fig. 1) ornamenting the pediment of the Walhalla, we find a union of Classic grouping and Romantic picturesqueness. The figures, though arranged according to the strict laws of symmetry, are too pictorial. Schwanthaler, however, worked under the most trying circumstances, for to sculpture after Phidias, Praxiteles, Skopas, Michael Angelo, Canova, and Flaxman, and to produce what he did is, in itself, an achievement worthy of attention. A restless spirit of artistic inspiration urged him to devote himself to ornamental art, and he has shown us what can be, and ought to be done in this direction. No national prejudice, no narrow-minded trade-unionism, should blind us to the quick, spirited, and original power of this decorative artist. Instead of wrapping ourselves in a knowledge-proof cloak of insular self-contentment, it becomes day by day more necessary for us to make ourselves acquainted with the works of art of other nations in a thoroughly Catholic spirit of love for beauty. Till now, we have tried to cause art and taste to reach the nation through a side-door of sacerdotal mysticism. Apparently we despaired of inspiring the masses with any higher artistic feeling by any other means, and thought, as did some persons in Germany some sixty years ago, to attain our end by encouraging an artificial sentimentality for symbolic masquerades or religious performances. The Romantic spirit took an architectural direction with us, and painting and sculpture were to serve in a subordinate position. The copyists of Mediæval forms did not go to Rome, Florence, Venice, Athens, Pompeii, or even to Paris, to work in an eclectic spirit and feed their imaginations, so that they might produce modern works of art in a progressive spirit. They managed more comfortably; they pored over illustrated and illuminated missals, and studied ornamentation and decorative art from old MSS., twisting shamrocks and thistles, oak-leaves and acorns into geometrically arranged

designs, reproducing here and there a big-headed saint, or a spider-legged angel; with this, and the repetition of sanctimonious phrases, they thought to satisfy the requirements of genuine art. The Germans, on the other hand, dived into history, studied the Antique, and tried to find analogies and links in forms connecting the Classic and the Christian world, as did the fathers when they transplanted Plato, Aristotle, Buddhist, and Egyptian mysteries into their ecclesiastical dogmatism, uniting the old world of thoughts with the rising spirit of Christianity. Schwanthaler's group is conceived in this spirit. On one side of the mighty central figure of Arnim, trampling under foot Roman trophies, are grouped Teuton warriors with battle-axes, clubs, swords; an inspired bard makes his harp resound to battle-songs; fair maidens and women exhort their brothers and husbands to heroic deeds, or bid them die on the field of honour, faithful unto death to their country. On the other side, Varus thrusts a sword into his own breast, and Roman legionaries fight despairingly with Jove's thunder and lightning on their shields; but the thunder is only painted, and the lightning is but a conventional ornament. The work is executed in a Romantic spirit well balanced by Classic studies. Charming in composition and grouping, but less perfect in detailed execution, is his relief, *The Birth of Aphrodite* (see Fig. 2), from a frieze in one of the upper rooms of the Royal Palace at Munich. Aphrodite, borne by a lovely group of Naiads, approaches the shore, led by Eros, triumphantly holding aloft a torch, and riding on a dolphin, whilst bearded Tritons blow congratulatory blasts upon their shells. On an altar the sacrificial flame of love is burning. The whole work exhibits in the too strongly curved lines of the female bodies a spirit of sensuality. Full of characteristic individualism is the statue of the great philosophical poet Herder (see Fig. 3), by L. Schaller, who, though born at Vienna, settled in Munich, and must be considered to belong to the Southern school of sculpture. The monument has been executed in bronze by F. Miller, and adorns one of the squares at Weimar. On a marble pedestal, measuring 9ft., the statue rises to a height of 10ft. The artist gives us the great philosopher in an earnest, meditating attitude, without any affectation in the drapery. The group of Chiron instructing Achilles to play the Lyre (see Fig. 4), by F. Brugger, is full of unpretending grace in an Antique style. We scarcely know of a work of modern art in which the Classic is so well used to express a deep Christian feeling as in the group of "Pietas" (see Fig. 5), by P. Widmann. The Virgin mourns in silent grief over the dead body of Christ, whose beautiful human form, and calm smiling face, well embody a self-sacrificing Divinity. Quite in a different spirit is the *Triumphal Procession of Bacchus* (see Fig. 6), by E. Hänel, from a frieze on the exterior of the theatre at Dresden, which has unfortunately been destroyed by fire. Hänel belongs more to the Northern school of sculptors, though he studied at Munich, Rome, and Florence. He is more addicted to the Antique, though he is full of passionate animation, and hides a second thought in his compositions. The half-animal, half-human forms of Bacchus and the surrounding Bacchantes and Fauns are chosen to express the degrading influence of the cheery God of Wine, when he is wild with unruly excitement. The lines of the groups are admirable in their wave-like beauty. His statue of Raffaele, for the facade of the new Museum at Dresden (see Fig. 7) is ideal in conception but rather cold and stiff in its pose. It is beyond the limits of our Art Studies to enter more deeply into a consideration of all the grand works of art that have been executed since the beginning of this century in Germany. All we can do is to draw the attention of the public, and especially of

our young art students, to some of them, to show that art may be cultivated for a higher purpose and need not altogether sink into a mercenary slave of bad taste and the commercial "Shibboleth" of demand and supply. We have before mentioned E. Rietschel (see BUILDING NEWS, October 16th, 1874), and give another proof of his great plastic power in a group from the northern pediment of the theatre at Dresden: *Orestes persecuted by the furies* (see Fig. 8). The grouping is varied, and still perfectly intelligible; there is a rhythmic symmetry in the use of space, masterly truthfulness in the single figures, and a correct finish in the delineation of all the characters. In the centre stands Dionysius as the protector of the Tragic Muse; the Furies hasten to seize Orestes, whose mother, Klytemnestra, the beautiful sister of Kastor, Pollux, and Helena, lies murdered by her son, mourned by her attendants, whilst in the corner is the dead body of Ægisthus, her seducer, and the murderer of her husband Agamemnon. Orestes, on the other side, sinks at the feet of Minerva, who raises her hands protestingly; whilst behind her sit the dignified judges of the Areopagus, ready to acquit the unhappy matricide. The group is executed in sandstone, with all the sharp treatment of marble. A building decorated in such a style, and devoted to theatrical representations, must be looked upon as a temple consecrated to high art, and not to mere sensational representations for pecuniary profit, which pander to the uncultivated taste of the masses. The different branches of art must work hand in hand to produce a civilising and purifying influence on a people. I. M. Wagner, of whom we give another Classic subject, a scene from the great festival and mysteries of Eleusinia (see Fig. 9), belonged to the older and severer Classical school. The composition is founded on Schiller's immortal poem, representing the moment when the gentle goddess, Demeter, teaches men to offer less sanguinary sacrifices to the gods, and substitute the fruits of the Earth, which Zeus accepts, kindling the sacrifice with his lightning as a token. Some savages, touched by higher feelings, throw themselves at the feet of the civilising goddess, forsake their sanguinary weapons, turn them into implements of peace; the serpents of discord and wild rage are vanquished; and men's hearts receive the divine teachings of agriculture, family love, and industry from the inspired lips of "Mother Earth." The Mother with the Child (see Fig. 10), by Konrad Eberhard, may serve to represent that school of sculptors who were opposed, like Aschermann with his *Pietas* (see Fig. 12), to the Classicists. There is something touching and deeply emotional in both the groups. The former reminds us of the delicate forms of Fiesole; whilst the latter, now in the Cathedral at Münster, is in a more sensational style, giving the Virgin and Christ an expression of gloomy grief and despair. Cheerful and Classic in composition is Henschel's relief, representing *Sowers* (see Fig. 11). He delighted in religious representations, in which he showed great delicacy, and a careful study of the Antique. The next group, a dying Amazon, supported by another (see Fig. 13), by Emil Wolff, was finished at Rome in 1841 and bought by Lord Grosvenor for his rich collection of artistic masterpieces of all nations. Wolff's style is noble, his forms refined, and the treatment of his difficult subject praiseworthy. The contrast between the dying, and the composed though sorrowful, Amazon is highly effective. Steinhäuser's statue of the great astronomer Olbers (see Fig. 14) is one of those conventionally cloaked figures which, though dignified and simple, look as though they had been manufactured by the dozen, to be provided with special heads and then inscribed Olbers, Herschel, Canning, Peel, or any other name. The statue is 9ft. 2in. high, standing on a pedestal of 7ft. 4in., and was erected in the astronomer's native town Bremen. A vast



amount of sculptural work could be done in England, if every rich town were to have a kind of "hall of fame," even on a small scale. The men of genius, in poetry and arts, in sciences and theology, in the Army and Navy, would keep many sculptors employed, and our towns, by recording great deeds in elegant statuary, would gain in interest and fame. That our Walhalla should be merely a gloomy corner in a Gothic abbey, in which monuments in all styles are incongruously heaped together, is to be regretted, and is unworthy of a nation which has accumulated during this century more wealth than any other on the surface of the globe. Let us hope, that in time, our national outlay in alcoholic drinks will diminish, and that we shall devote some of the millions of pounds sterling thus saved to a genuine culture of the fine arts. The Horse-tamer (see Fig. 15) by Hofer, a group in Carara marble, is very much in the style of the Horse-tamer on Monte Cavallo, ascribed to Phidias (see BUILDING NEWS, July 18th, 1873). Though the position of both horse and man is different, the spirit pervading the group is entirely Classic. This group is wanting in breadth, and the same may be said of the two horse-tamers in bronze, ornamenting the northern entrance of the Royal Palace at Berlin. We give one of these groups (see Fig. 16). They are the work of the St. Petersburg sculptor, Baron von Klodt, and were presented by the Emperor Nicholas to the King of Prussia. Both groups are very much alike. The horses are conceived and executed in a spirit of powerful naturalism, but the male figures are too elongated, and their repose too strongly marked, producing a stiff and very forced effect. That the Antique is cultivated in Russia may be seen in the two groups.

The more we study the works of other nations, the stronger must become our conviction that wherever art attains the high standard of beauty, it loses its special characteristics. Whether we consider the women of Titian, the graceful forms of the reliefs from the Parthenon, or the types of women by Canova, Flaxman, Danecker, or Schwanthaler, we find everywhere some family likeness amongst them, which originates in the idealisation of the human form. There cannot be different kinds of art; so soon as nature is elevated by the creative power of a genial artist into the realms of genuine art, it receives a general stamp of divine idealisation, the speciality disappears, and is transformed by the very idealisation into a subject of general admiration. As the Greeks attained this perfection in sculpture, and the masters of the Cinque Cento period strove for it in painting, we should never tire of studying the works of both, in order that we may become inspired with their mode of artistic creation; for they knew that without "unity of design, unity of thought, unity of action, unity of colour, and unity of composition, harmonised for an ideal purpose," true art was impossible.

G. G. ZERFFI.

#### INTERMITTENT DOWNWARD FILTRATION IN CONNECTION WITH THE SELF-ACTING SEWAGE REGULATOR.

A SHORT time ago we called attention to this subject, and described a "Self-acting Sewage Regulator," a simple, though clever, contrivance of Mr. J. Bailey Denton, C.E., of Whitehall-place. We now recur to the subject to mention the latest analysis of the effluent, which is very favourable. The object of the improvement, as we then explained, is to deliver and distribute the precise quantity of sewage the soil can properly absorb, and disinfect without saturation or clogging, and without the ebbs and flows, as in the inconstant and uncertain discharges of sewers from all small towns and villages where the outflow at one time may be so copious and deluging as to defeat the object in view, and at another time scarcely anything at all. But the action of the apparatus being intermittent, the soil has time to recover its absorbing condition at

every efflux from the regulator outlet; in fact, the action is so regular that the soil thus treated may be compared to the lungs, continually inhaling and exhaling the pabulum necessary to the vitality which it sustains. This intermittency of action is automatic; no attendant is required, as in the ordinary systems, and the siphon principle on which it depends is a guarantee of efficiency and freedom from derangement. Indeed, the non-liability of the regulator to get out of order is a point of merit that cannot be too strongly dwelt upon in these days of complex machinery.

When we inspected Mr. Denton's exhibits at the International Exhibition we observed the purity of the discharged effluent, which was devoid of any disagreeable smell. We may here add that recent examination has shown a marked improvement since that time, a fact that we think, in justice to the system, should be publicly known. London sewage has been daily delivered by the authorities of the Exhibition at Kensington, and the quantity that has passed through Mr. Denton's filter of natural soil has been 25 gallons. This quantity has been daily distributed over the surface of three cubic yards for a period of four months, and it was reasonable to expect that a constant application of London sewage upon so small a quantity of soil would in that time have rather deteriorated than otherwise the quality of the effluent. Dr. Benjamin Paul's analysis of the effluent in June last was, of

Free ammonia . . . '009 in 100,000 parts.

Organic nitrogen . . '049 "

It is rather remarkable no deterioration has taken place, and the recent analyses, which we now quote, will satisfy the most sceptical as to results. On the 10th of August, forty-eight days after the first application of sewage, the same able chemist's analysis was:

Free ammonia . . . '006 in 100,000 parts.

Organic nitrogen . . '038 "

while the last analysis just made shows even a better result:

Free ammonia . . . '002 in 100,000 parts.

Organic nitrogen . . '022 "

These figures speak for themselves. The Rivers Pollution Commissioners' standard of purity was satisfied by the first analysis, which we also considered very satisfactory; in fact, the Commissioners say that more than '3 parts of organic nitrogen in 100,000 parts should be deemed inadmissible, while the drinking-water supplied by the different metropolitan companies has an average of not less than '028 of organic nitrogen in the same quantity. We cannot doubt that the increased purity of the effluent from the sewage-charged soil is due to the continual oxidation induced through the pores, thereby cleansing itself, as a sponge, by constant absorption and discharge, rather than "clogging" the soil, as many may imagine. The system of intermittent downward filtration must, at present at least, be recognised as the only way of utilising or purifying the sewage of towns. Small areas of land, as 1 acre to 1,000 persons, by the system of Mr. Denton, may be as safely treated as larger areas. In conjunction with irrigation the farmer can economically distribute his sewage in one or in both ways, just as the land may require the sewage or not. In fact, the agriculturist or sanitary authority can either pump the sewage to a higher level or allow it to flow out by simple gravitation, just as would be most desirable. Sometimes the cost of lifting the sewage of a small town bears a heavy proportion to the inhabitants and the advantages offered, while the downward filtration process may be readily adopted at the slightest cost, while it is far the best means for highly diluted sewage.

Taking as an illustration a district with a population of 15,000 and a rateable value of £45,000, and appropriating fifteen acres of land for the purification of the sewage, Mr. Denton shows the following figures:—

Land . . . . .	£ 3,000
Under drainage carriers for distribution, &c. . . . .	2,000
	5,000

The charge on the district, with interest necessary to repay this sum, would be £225 per annum; and if the land be divided into three parts, ten acres may be let to market gardeners at a small rent, say £10 an acre, while 5 acres devoted to the sewage for one year would, it is calculated, secure £5 an acre clear of all expenses; thus £125 would be realised, and the £100 remaining upon the

work would, if apportioned on the rateable value of the property, amount to less than a halfpenny in the pound. Taking a larger area of land, where the cost of preparation would be comparatively less, the profits would be far greater, and the disposal of sewage attended with a loss scarcely felt by the ratepayers, while if intermittent filtration be combined with surface irrigation, the profits and advantages would be considerably augmented. One thing is secured by the intermittent filtration of Mr. Denton's system, and that is, the utmost economy in the distribution of sewage matter over our land.

#### ARCHITECTURAL ASSOCIATION.

THE opening conversazione of this Association for Session 1874-75, was held on Friday evening last, and was most numerously attended. This was the inaugural meeting of the thirty-third year of the Association's existence, and but for the extra accommodation provided by the Royal Institute of British Architects (who lent their suite of rooms for the occasion), the two large galleries generally devoted to the conversazione would have been too small for the occasion. Refreshments were this year served by Messrs. Spiers and Pond, in the Museum of Building Appliances, instead of in the smaller gallery, and this gave additional room for the visitors. The various drawings submitted in competition for the prizes offered by or through the Association were exhibited on the walls of, and on screens in, the Institute meeting room, and made a goodly show, some sets exhibiting exquisite powers of draughtsmanship. There were numerous exhibits in the shape of articles of furniture and materials of decoration, and, in addition, Loppé's pictures of Alpine Scenery were on view. Coote and Tinney's band was in attendance, and contributed greatly to the enjoyment of the evening. At nine o'clock,

Mr. G. H. BIRCH, the President, delivered a short address. He said they had met to inaugurate the thirty-third year of the Association's existence, the Association having been founded in 1842. Although it had been so long established, however, it could never, in one sense of the word, grow old, inasmuch as it would always be a junior society, composed of junior men whose aim and object it was to render mutual assistance to one another in order to qualify themselves as architects. The motto of the Association, "Design with Beauty, Build in Truth," expressed the fundamental principle of its existence, as expressed in the Classes of Design, Construction and Practice, &c. Like the late President, Mr. Tarver, he could bear testimony to the great value which these classes had in qualifying the young architect for the active duties of his profession. Among the 600 members who constituted the Association there were many who had attained to distinction. The Association steadily increased in numbers and importance year by year, and with its numerical increase its area of operations was also largely extended. New classes, new outlets for the pent-up activity of the members, were annually being formed, all tending to the promotion of a thorough knowledge of architecture among the members. Some viewed the great accession of new members to the profession as a fact to be groaned at rather than as a source of rejoicing, for on a superficial view of the case, the first question that would arise would be "Where is all the work coming from to give employment to so many aspirants?" But did not this show most unmistakeably on the part of the public an increasing interest in and recognition of the work of the profession? Surely unless the demand existed there never would be such a supply. Although the work done by the Association during the past year had been great, there was room for considerably more activity and industry on the part of the members. The various classes might be attended by greater numbers; there was still room for more, and until the cry for want of space was heard, then, and then only, could the Association be said to be in a truly prosperous condition. No enumeration of members by hundreds or tens of hundreds would give the Association the prosperity which it could only derive from its classes being well attended. After some further remarks, the President proceeded to present the various prizes which had been offered by or through the Association last session, and which were as follows, all except one being presented in the shape of books:—

Class of Design Prize (2) guineas for the best set of sketches contributed in the class during the



year. Awarded to Mr. P. J. Marvin. Prize of £1. 1s. for the second best set, awarded to Mr. L. A. Shuffrey. Honourable mention made of the sketches by Mr. Arthur Ingleton.

Class of Construction Prize (2½ guineas) for the best series of papers submitted at meetings of the class. Awarded to Mr. Henry Tanner. Second prize (1½ guineas) for the second best series, awarded to Mr. George Jackson. Honourable mention made of Mr. W. W. Robertson.

Class of Elementary Design Prize (1½ guineas) for the best series of studies submitted during the session, awarded to Mr. A. W. Hennings. Honourable mention of those submitted by Mr. C. L. Cadney.

Class for the Study of Colour Decoration Prize (1½ guineas) for the best series of sketches submitted during the session, awarded to Mr. W. Scott.

Architectural Union Company's Prize (£5. 5s.) for the best series of measured drawings from existing buildings in England, or portions of the same, erected previous to the eighteenth century. Awarded to Mr. E. J. May (motto "Quis") for his drawings of Avebury Church, Wilts. Second prize of £2. 10s. for the second best series, awarded to Mr. G. D. Oliver (motto "Persevere") for his drawings of St. Mary's Church, Warmington, Northants. Extra prize awarded to Mr. G. Langford (motto a cross in a circle), for his drawings of the Temple Church, London.

Association's Prize Fund Prize (£5. 5s.) for a design for a cloister to a public building. Awarded to Mr. W. Talbot Browne. Honourable mention accorded to Mr. L. A. Shuffrey's design.

Association's Prize Fund Prize (£5. 5s.) for a design for a small villa, to cost £1,500, with complete detailed specification. Awarded to Mr. H. W. Pratt. Honourable mention made of Mr. W. S. Jackson's design.

Association's Prize Fund Prize (£5. 5s.) for a design for the decoration in colour of a Baptistery (polygonal) attached to a church. Awarded to Mr. W. Scott.

Association's Prize Fund Prize (£5. 5s. in money) for the encouragement of architectural sketching. Awarded to Mr. G. D. Oliver.

The presentation of prizes being concluded, Professor KERR, after congratulating the Association upon its continued progress, and expressing his confidence that perseverance in the course which had been so well pursued for many years would still maintain the usefulness of the Association, said it behoved the young and rising members of the architectural profession—as members of a profession of dignity, of intelligence, and of great usefulness to the public—to keep their eyes constantly fixed upon the purpose of their education, and to maintain a consistent course both of study and of conduct with a view to not merely the service of the public, but the service of their art. We lived in a very remarkable epoch, an epoch which might be described as one witnessing the change from the Gothic style to the Classic, and we were perhaps in about the third year of the decade which would have to elapse before the change was entirely effected. That was a rather hazardous assertion to make in that company, but it was made in all sincerity. The Gothic style of architecture as revived in this country could but have its day, and no more, as it was subject to the laws which governed all developments of that kind, and consequently, in obedience to those laws, it must pass away—he would not say as a fashion, but as a study absorbing the attention of the profession. Change was inevitable, more particularly in a period like the nineteenth century, when changes were all based upon the revival of knowledge, and it followed that we must change from one revival to another if we were determined to maintain an interest in the revival of Mediæval architecture. We must go on reviving one thing after another until we had exhausted the whole domain of antiquity, and then the aspirations of some of the more earnest spirits for the invention of a new style might be fulfilled. Taking the revived Gothic style for all that it was worth—and it was worth a very great deal—he thought the time had come, looking at the matter as a critic, and not as a partisan, when it must wane. He thought the introduction of the "Queen Anne" style, mere crotchet as it might be, afforded ample evidence of a change in the current of taste in one direction, and in only one, because it was perfectly plain to those who understood Classic details—and there were not many who did

understand them now—that the "Queen Anne" style was tending directly towards Classic architecture. It was a stepping-stone by which we were to pass from the practice of Gothic, which had been a great success with us, to the practice of some kind of Classic—he would not say of what kind, it was impossible to predict at present—which he hoped would be another great success. But what would be the verdict which the historian of architecture fifty years hence would pass upon the Gothic revival? That was a very interesting question, and one well worth consideration and inquiry. He did not know that we were sufficiently impartial to say what would be the opinion of the critic in twenty, thirty, or forty years hence. His (the Professor's) opinion was that it would be this: that the great bulk of the "muscular Christian" work which was being done at the present moment would be relegated to the limbo of unsuccess. But there was a certain proportion of Gothic work done during the last fifteen years which was superb; indeed, there was nothing in the whole range of English architecture which was superior. It was creditable to the genius of English architects that they had produced such examples. They were characterised, not merely by a cold, calculating refinement of form and gracefulness of design, but by a passionate, and ardent, and romantic self-sacrifice on the part of the designer—and there were some men who seemed to design with their teeth clenched. It was this romanticism which he admired. It was passionate, earnest, eager, ardent work, to what end it need not be said; but certainly while it was in progress it developed characteristics of the highest class, and produced works deserving of the highest commendation. This would be, he thought, some measure of the verdict. Another very remarkable point to be remembered as identified with the Gothic revival was the singular ascendancy of amateurs in architecture—one of the most discreditable incidents in the history of art that the whole world could produce; discreditable, he meant, to the profession. The Gothic revival turned upon something which was easily converted from æsthetics to archæology. Now the æsthetics of architecture were not easily understood by the architectural amateur, but the archæology of architecture was very easily understood—nothing more easily; and, therefore, when architects came to surrender their sole government of the æsthetics, and to admit the archæology of one class of persons, another class of persons had had the government of the development of architecture, and architects had bowed their necks to this ascendancy, which had been firmly and courageously maintained, until at the present moment an architect could hardly call his soul his own, owing to the interference of outsiders—from the reviewer who wrote a fantastical article, to the Prime Minister who chose to illustrate an argument by throwing dirt at the whole architectural profession of the country. What, then, was the course to be adopted by the young and rising generation of architects? There were two pieces of advice which he would take leave to give them. In the first place, they should do their endeavour to maintain that which their predecessors had not maintained, viz., the ascendancy of the profession in professional matters. They might depend upon it that this country could never acquire a permanently high position in architecture unless architects were the masters. It was preposterous to suppose that English architecture could stand well with foreign nations so long as English architects allowed the interference of amateurs; and he asked the young men of the profession to consider well whether they ought not to totally disregard amateur criticisms and interferences, and to treat them with that perfect contempt and disdain which they would meet with in every other profession. Secondly, he wished to advise the junior members of the profession—not as a partisan, nor in immediate connection with the subject he had introduced—to study Classic architecture more than had been their wont. Gothic architecture had had a long innings, and the turn of Classic architecture would come, if it had not come already. There was something in Classic architecture of the best which it were vain to ignore and pooh-pooh. As an old Classic man, and as an inveterate admirer of Classic all his days, he could say that there was something in Classic architecture, whether it be the pure antique Greek, the more masculine Roman, or the modern Italian (or, as he called it, the modern European) when at its best, or whether it be the French

(which is the best of the modern European work) whatever phase of Classic architecture they chose to take, in the best examples they would find food for the artistic intelligence of the highest and most satisfying kind. They would find a calm and dispassionate elegance pervading the work, which he would not say did not exist in Gothic work (although that was his opinion), but which had never been produced in Gothic work without the sacrifice of the much more Mediæval characteristic of picturesqueness, which in such work was not worth sacrificing for the sake of elegance.

Mr. R. W. Edis and Mr. Phéné Spiers also addressed some observations to the meeting.

The first ordinary general meeting of the session takes place this (Friday) evening, when the President will deliver an opening address.

#### ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE inaugural meeting of Session 1874-75 of this Institute took place on Monday evening last, the President, Sir George Gilbert Scott, R.A., in the chair. The minutes of the last meeting of the past session having been read and confirmed, and several donations of books, &c., announced, Mr. Henry C. Harris, of the Indian Civil Engineering College, Cooper's-hill, was balloted for and duly elected an Associate of the Institute, and several nominations of membership were read.

MR. E. WELBY PUGIN.

The PRESIDENT: It is my very unpleasant duty to have to announce to you that at a meeting of the Council held on the 13th July last, it was resolved, in conformity with Bye-law 16, Section 3, that Mr. E. W. Pugin be declared no longer a Member of the Royal Institute of British Architects. (Loud and prolonged applause.)

#### THE PRESIDENT'S ADDRESS.

Sir GILBERT SCOTT then proceeded to deliver his opening address. After apologising for his absence at the opening meeting of last session, which was necessitated by his having had, in deference to medical advice, to indulge in a six months' cessation from business—his first absence of that duration from business for forty-two years—he referred to his visit to France and Italy, and expatiated at some length on the advantages of foreign travel not only to the student and young architect, but to the older and more advanced members of the profession. The architect who, after thirty years of constant application to his profession, revisited the buildings and monuments which he had visited and measured and sketched in his youth would, while recuperating his physical energies, have his zeal and enthusiasm awakened afresh. Proceeding with his address, he referred to the obituary of the Institute for the past year, which included the names of M. Battard, of Paris, hon. and corresponding member; Mr. Elkington Gill, of Bath; and Mr. W. Perkins, of Worcester, an old pupil of Thomas Rickman, of honoured memory. Mr. Perkins was official architect of Worcester Cathedral, and carried out the restorations there in a very conscientious and able manner. Lastly, not only the Institute, but the world of art at large had sustained an irreparable loss by the death of Mr. Owen Jones. An ample memoir of his life and works by one who was intimately associated with him (Sir Digby Wyatt), would, no doubt, be read in the course of the session. After detailing the principal donations to the library during the past year, and the names of the successful competitors for the Institute prizes (all which appeared in the BUILDING NEWS at the time), the President referred to the bequest of Sir William Tite for promoting the study of Roman architecture, which had been referred to a special committee for consideration and report. A bequest had also been made for a special purpose by the late Mr. Thomas Grissell, of Norbury Park, to whom he (Sir G. G. Scott) was deeply indebted personally, for forty-three years ago he placed himself under Mr. Grissell with the object of learning a special branch of his profession. Sir Gilbert Scott then proceeded to pass in review the more important incidents connected with the Institute during last session, including the action taken with the view of preserving Ely Chapel, Holborn, from destruction; the Metropolitan Buildings and Management Bill, which had seriously threatened the interests of the profession, but which was, after reference to a select committee of the



House of Commons, withdrawn; and to the proposal which was made to add to the resources of the Institute by increasing the entrance fees and annual subscriptions, which was subsequently withdrawn, in deference to the feelings of the membership. Perhaps the proposal originated in unnecessary alarm, owing to certain heavy items of exceptional expenditure; but the whole question of the financial position of the Institute had been referred to a special committee for consideration and report. A representative society like the Institute should never be in danger of stripping the bottom of its purse, or of finding itself unable to meet any moderate amount of additional expenditure, which the exigencies of the profession might require. Such a position was beneath the just dignity of the Institute, and would render nugatory the objects for which the Institute was founded. In whatever way it might be found possible to add to the resources of the Institute, increased resources were greatly to be desired. Was the library of the Institute on a scale commensurate with the claims and dignity of the profession? Had the Institute the means of procuring carefully-measured drawings of existing ancient buildings which were fast crumbling into dust? Were the rooms of the Institute what they ought to be—a perfect record office of all the arts and sciences appertaining to architecture? Had the Institute the means of sending students abroad or over this country to study the great architectural monuments of the past? The Pugin Travelling Studentship enabled them to do a little in that direction; but were they to be content with that little? These were all points well worth attentive consideration, especially as the failure of the Soane Medallion competition last year had been a positive windfall to the funds of the Institute. He was glad to think that some of these objects were partially provided for by the Architectural Association, which had done and was doing so much for the education of the young architect. One circumstance, which was somewhat disturbing the public mind in relation to architecture and one of its noblest monuments, it might be hardly safe to allude to while so much excitement existed. Yet it was so important, that at all risks he must say a word or two on it. He alluded to the project for decorating the interior of St. Paul's. As to the desirability of this work, the Council of the Institute so long ago as 1870 passed a resolution cordially approving of it, and offering the sympathy and co-operation of the Institute; although without that voluntary expression of feeling it would have needed no assurance that the architectural profession would take the liveliest interest in the completion of Wren's great work. Sir Gilbert Scott then proceeded to give the outline of the intended treatment which was laid before the public four years ago. After alluding to the great care which would be required in the selection of artists and designers, and suggesting that a considerable amount of experimental work should be done before the final decision as to the treatment could be arrived at, the circular describing the proposed scheme, said that the leading principle affirmed by all who had been consulted, was to make Sir Christopher Wren's intentions for the planning and decoration of the Cathedral the main text, as it were, to be studied, and to carry out as completely and as faithfully as possible, whatever he might have expressed in drawing, model, or writing; and where these materials for guidance failed, to conform to the general treatment of the building. This course of action having been agreed to by the Executive Committee, they some time afterwards requested Mr. Burges, not as an architect, but rather as a man learned in Christian iconography, to furnish a scheme of decoration, which he did in a very masterly manner. At that time the official architect of the committee was also the official surveyor of the fabric, and it was not until two years later that the Committee determined to nominate an architect distinct from the surveyor to the Dean and Chapter. Sir Gilbert Scott said he was on the Committee at the time, although he had not acted, but he attended expressly to oppose the nomination of an architect other than Mr. Penrose. On the motion for nominating another architect being carried, however, he supported the nomination of Mr. Burges, feeling that his knowledge of Christian iconography, and Mr. Penrose's knowledge of Classic art, and of Wren's *chef-d'œuvre*, would be brought to bear in producing a successful design. Mr. Burges's instructions were, roughly speaking,

to follow Sir Christopher Wren's intentions wherever they could be inferred or ascertained. From all that had since transpired, it would appear that the most implicit freedom of communication, and the greatest possible mutual confidence were essential to the satisfactory preparations for the work; but the very reverse of this seemed to have existed on both sides, and hence the chaos and confusion into which the subject had drifted was not to be wondered at. His (Sir Gilbert Scott's) object in bringing the matter forward was to urge the importance and justice of an absolutely dispassionate investigation of all the questions which had been raised, each on its own merits. No doubt Mr. Burges had been placed in a very difficult position, which had been partly brought about by himself. He had been accused of speaking contemptuously or contumeliously of Sir Christopher Wren's work, but who did not sometimes in an unguarded moment give vent to words which he afterwards regretted? Mr. Burges could very well retort with the cry of disrespect of Wren's intentions upon Mr. Fergusson and his party. Had not Mr. Fergusson proposed so bold and radical a structural alteration as the conversion of the entire choir into a smaller dome? and had he not even gone so far as to say, in support of this proposal, that he believed it would have gladdened Wren's death-bed, and that if it were possible, he would now express his warm approval of it! Mr. Fergusson had more recently condemned the use of mosaic, and repudiated the Italian architects to whose works Mr. Burges had been referred. Unless the whole subject was calmly considered, the noble project would fall through. His (Sir G. G. Scott's) personal wish would be to see the two architects working hand in hand, each supplying that in which his special strength consisted. The work should be one of completion and decoration, and in no degree, however small, a work of structural alteration.

Structures to revive that Wren has built,  
Another Wren must rise.

Adverting to Mr. Ruskin's refusal of the Royal Gold Medal of the Institute, Sir Gilbert Scott said the circumstance had caused much annoyance, although it had culminated in an event which, but for a melancholy circumstance, would have been the chief event of the evening. Mr. Ruskin having thought proper to decline the medal, Mr. Street was unanimously elected, a previous resolution of the Council to the effect that it should be awarded to a writer on architecture in preference to a practical architect having been rescinded, although Mr. Street might deservedly be said to combine both qualifications in a high degree. In judging of Mr. Ruskin's conduct in declining the medal, there were several points to be borne in mind. In his (Sir Gilbert Scott's) communication on the subject with Mr. Ruskin, he had argued that the Institute and Mr. Ruskin were labourers in the same cause, whether that cause was the perfection of architectural art, the conservation of ancient monuments, or both; and that, so far as they had failed in these objects, they were sharers in that failure; and therefore, for Mr. Ruskin to refuse the Institute medal was, to say the least, vexatious and inconsistent. His ostensible reason for refusing the medal was the general havoc and spoliation which he found, under the name of restoration, in reference to ancient monuments; Mr. Ruskin had ever raised his voice against the artistic or non-artistic vices of the day, and he complained that the Institute took no notice of him twenty years ago when he lifted up his voice like a trumpet against the spoliation of the ancient monuments of the country. In his letter to Sir Gilbert Scott, Mr. Ruskin cited instances, one of which was the recklessness with which the ruins of Furness Abbey had been dealt with by the railway engineers! These instances Mr. Ruskin considered only too illustrative of the general tendency of the public and of architects to be apathetic and injuriously neglectful of the most precious works—some of which were destroyed upon the plea of restoration, and utterly sacrificed for purposes of mere temporary convenience. For the existence of this state of things he considered that the architectural profession was assuredly answerable, and under such circumstances he could not feel that it was time for architects to play at adjudging medals to each other, and solemnly declined to take part in any such complimentary formalities. Now all this might be viewed from many points. On the one

hand, the Institute, as the incorporated representative of the architectural profession, might, in a certain sense, be held to represent the vices as well as the virtues of the profession, and perhaps one of its failings had been that it had not invariably accepted as infallible the utterances of a self-constituted censor who was continually protesting and warning. Wherever he travelled, in France, Italy, or Belgium, he was constantly raising his voice, with righteous indignation, against the obliteration by restoration of some monument of antiquity; and to his eyes the best restorations in this country were mere Vandalisms, and he protested against them root and branch. The spirit of deliberate destruction had been rife amongst us. Knowing, then, Mr. Ruskin's views, it was not to be wondered at, on consideration, that he did not permit his ascetic course to be softened by the proffered compliment of the Royal Gold Medal. Fully, however, as it might be admitted that the Institute had cause for humiliation, it should be remembered that Mr. Ruskin's merits consisted rather in words than in deeds, and in reconsidering the award of the medal for a second time, the Council determined to transfer the honour to one who had done much practical work in and for the profession, and who was, withal, a powerful and instructive writer on architecture. Mr. Ruskin had said that they had no right to bestow or receive honours; but surely it was right to recognise merit wherever it was found. He (the President) must congratulate the Institute on having made a better choice of a recipient of the medal than the choice which had first been made; for to the anathematiser of what was bad was due far less consideration than to him who practically carried out what was good. Very early in life he had known Mr. Street, and could testify, if testimony other than that existing in his works were needed, to the intense devotion to his art which he manifested, and to his almost superhuman capabilities for hard work. Mr. Street had been unflinchingly loyal to the great Gothic revival, and that in its best form—faithful to the earliest and most perfect types of Mediaeval art—and no revival could be defended which was not based upon the best and most vigorous types. His loyalty to the revival had not been in the least affected even by the blandishments of the Queen Anne style. He (Sir Gilbert Scott) envied and revered Mr. Street's unbending steadfastness in the course which he had marked out for himself, and he hoped that the great work which he had now in hand—the New Law Courts—would be carried out in a manner worthy of the design and of the purpose of the structure, without regard to petty economies so-called. In conclusion, he expressed his profound sympathy with Mr. Street in the great bereavement he had sustained by the death of his wife, and in Mr. Street's unavoidable absence on this account, he presented the Royal Gold Medal, amid the applause of the meeting, to Mr. Pearson, who had been deputed by Mr. Street to receive it, and in doing so, expressed the hope that the time would come when Mr. Pearson would receive the medal otherwise than as the deputy of another.

Professor Donaldson moved, and Mr. T. H. Wyatt seconded a vote of thanks to Sir G. G. Scott for his address. The meeting terminated somewhat earlier than usual.

#### THE SANITARY REFORM OF VILLAGES.

A GENERAL meeting of the members of the Farmers' Club was held on Monday evening at the Salisbury Hotel, Salisbury-square, to hear and discuss a paper by Mr. James Howard, late M.P. for Bedford, on "Our Villages: their Sanitary Reform." Mr. E. M. Major-Lucas occupied the chair. Mr. Howard said that although the Farmers' Club had already discussed the great subject of the sewage of towns and cities, it had, singularly enough, never once turned its attention to the more home question of village sewage and the sanitary condition of our rural population therein involved. Until the passing of the Public Health Act of 1872 the various sanitary Acts, so far as rural districts were concerned, were almost a dead letter. This Act, although deficient in some particulars, was important, as it rendered the action of local authorities compulsory, so that most of the evils must be dealt with in some way or other. Proceeding to the practical question—What could be done to remedy existing evils? Mr. Howard



said he attached primary importance to the water supply, because, next to the food of the people, it was the most important requirement for every community, and an abundant and pure supply was one of the greatest blessings of life; whilst, on the other hand, there was no more fertile source of disease and human dread than bad and contaminated water. At present the majority of villages suffered from scarcity or impurity of water, or both. There were no natural causes for such a state of things, and the fault rested with the community, which grievously wasted and neglected one of the most precious gifts of nature. It was the general opinion of sanitary authorities that where good water could be obtained at a depth not exceeding 30ft. a well was the best provision; but there were wide tracts of country where wells were quite out of the question, and in such cases he recommended storage of surface rain-water in open reservoirs, which could be constructed at a comparatively small cost, and provided an abundant supply during the summer months. He had found from experience that rain-water so stored kept good enough for domestic use throughout the year. Another plan was to collect in tanks the rain falling on the roofs of houses. A tank sufficient for two ordinary-sized labourers' cottages could be constructed at a cost of £2 per cottage. The value of such a means of storage was illustrated by the estimate that from the roof of an ordinary cottage as much as 7,000 gallons per annum might be collected with a rainfall of only 20in. Care, however, should be taken to prevent the influx of impure water from surface drainage. Passing to the subject of drainage and sewerage, he said a great variety of schemes had been before the public for dealing with sewage, but practically there were only two systems open for rural districts, viz., earth or box closets and water sewerage. In scattered villages a general system of drainage was in most cases out of the question, not only on account of the expense, but because waterworks were an essential portion of the plan, and sewage irrigation, whilst successful and economical on a large scale, was troublesome and expensive on a small one. Although favouring the system for "populous places," he thought that for villages the earth or box system, similar to that introduced upon the estate of Sir Anthony Rothschild, would have to be depended on. With respect to water sewerage, he said the Local Government Board had recently decided, he thought unwisely, that house-slops did not come under the head of sewage, and could therefore be discharged into rivers and streams; but there was no doubt that the public would take a different view of the matter. He hoped to see speedy legislation upon the pollution of rivers. But for the length of time taken by the commissioners in completing their report, he knew that the late Government were prepared to deal with the subject. Now that we had a Government whose policy was endorsed as a "sewage policy," there ought not to be a doubt that it would be effectually and quickly dealt with. One of the difficulties of carrying the present sanitary laws into effect was the perplexity arising from the number of Acts of Parliament partly in existence and partly repealed, and also from the mixture in the Acts of urban and rural provisions in such a way as to render it a matter of considerable doubt what the law really was, and causing much trouble even to experts. The only remedy was a consolidation of the Acts, or the framing of a new general Act repealing all others. After enumerating a number of defects in the provisions of the rural sanitary laws as to sewerage, overcrowding, and infectious diseases, Mr. Howard called attention to the fact that where well-considered sanitary measures had been adopted in towns and cities the advantages to the inhabitants had been so marked that the circumstances should act as a stimulus to exertion in carrying the same benefits to our villages.

A discussion followed the reading of the paper.—Mr. Hope, of the Sewage Farm, Barking, observed that there was a possibility of open reservoirs becoming fouled by fallen leaves and other decaying vegetable matter, and on that account the plan was not free from objection.—Dr. Voelcker held a contrary opinion, thinking that the exposure to the air would oxidise everything obnoxious in the water.—Mr. H. K. Fowler opined that the earth-closet system would not succeed unless the cottagers were well looked after. He believed in "educating" the people into sanitary improvements, and that farmers as a rule were reluctant to spend money upon such schemes.—

Mr. Treadwell also believed in leading the people rather than driving them.—Mr. Pell, M.P., said that however desirable it might be to adopt the earth system, it was impossible to do without the other, which must be connected with it. The local authority could scarcely undertake the water supply in rural districts, because it would not pay to do so. It was more a matter for private enterprise. He was inclined to doubt the value of the services rendered by medical officers of health to local authorities. The causes of disease were well known, and they did not need a doctor with £800 a year to tell them. What was wanted was the steady application of sound, practical men, who would proceed at once to do good sanitary work.

#### THE PINES AND SPRUCE FIRS OF THE UNITED STATES, CANADA, AND NOVA SCOTIA.

THE black spruce is most abundant in Lower Canada, Newfoundland, New Brunswick, Nova Scotia, the district of Maine, Vermont, and the upper parts of New Hampshire, and it is so multiplied as to cover, in many instances, a third part of the forests to be found in these parts. The trunk, unlike that of the pines, is smooth, and is remarkable for tapering perpendicularly from base to summit. Known by other names, as are also some of the pines, it cannot be too often insisted upon that this confused nomenclature arises in most cases from the same species of tree producing differently coloured wood when subjected to varied influences of soil, climate, and culture.

The black spruce possesses strength, lightness, and elasticity, and makes good spars, knees, and rafters. Some prefer it for floor boards, but it is most certainly more liable to shake than the white spruce. It is, however, the white spruce that is best known in the markets here, and this species is indigenous to the same countries as the preceding. "Epinette blanche" in Canada, it becomes white spruce in Nova Scotia, whilst New Brunswick and the district of Maine recognise it as single spruce. This species grows in nearly the same situations as the preceding, but it has a more tapering trunk and is inferior in stature, rarely exceeding 50ft. in height, and 12in. or 16in. in diameter at 3ft. from the ground.

Hemlock spruce is natural to the coldest regions of America, and begins to appear about Hudson's Bay, and in the neighbourhood of Quebec, it is very abundant, also in Nova Scotia, New Brunswick, the district of Maine, the state of Vermont, and the upper part of New Hampshire. It is always larger and taller than the black spruce. It attains the height of 70 or 80ft., with a circumference of from 6 to 9ft., and uniform for two-thirds of its length. But if the number and distance of the concentric circles afford a certain criterion of the longevity of the trees, and the rapidity of their vegetation, it must be nearly two centuries in acquiring such dimensions. This tree is distinguished by the peculiarity of sometimes ceasing to grow at the height of 24 or 36in. In this state it has a pyramidal shape, and its compact tufted branches adhere to the ground. Writing of the hemlock spruce, an able judge says, "It is esteemed an excellent in wood." This species has been introduced into this country, but for merely ornamental purposes, and fine specimens are by no means common here. In 1825 Douglas found immense forests of the spruce which bears his name, in North-West America, between 43deg. and 50deg. north latitude. Within these limits trees of 10ft. in diameter and from 100 to 180ft. high were observed, and he mentions the stump of one upon the river Columbia, which, exclusive of the bark, at 3ft. from the ground, was of the enormous girth of 40ft. The same traveller speaks of the wood as being firm, heavy, with few knots, of a yellow colour, and not in the least liable to warp, this last being a very desirable quality. It was originally discovered in 1797 in Nootka Sound, by Menzies, who accompanied Captain Vancouver on his voyage round the world, but for practical purposes its discovery dates from Douglas in 1825. The ports lying nearest to North America, such as Liverpool receive the largest quantities of such good as spruce and pine, and as a matter of course the material enters largely into the construction of buildings in such vicinities. In London and its neighbourhood, spruce is not so largely employed in building, although it has many good qualities. The additional freight to the East Coast renders Baltic goods cheaper, but just at the present time

both pine and spruce are very low in price, considering the times. From Quebec to London a fall of 40s. per standard has recently taken place, and such a circumstance is almost without precedent. The leading brokers in their Circular say: "Pine deals have been unsaleable, except by forced auction sales, and then at much reduced prices. The sales have been on a very small scale. Spruce deals have been sold in large quantities, at continuously falling rates. We think they must now have pretty well reached the lowest point, as they cannot be bought in at present prices, except with present rates of freight, which will not continue after the fleet now at Quebec has sailed." Of white pine the same authority remarks: "The import has been larger, our demand for this article is very limited, and very little has been done with the new arrivals as yet. From New Brunswick we have had a considerable excess of supply of spruce and pine deals, but they have not sold so freely as Quebec spruce, which are prepared."

Such is a brief glance at the characteristics of the noble and useful tree, which thrives where others would die. Every joiner and carpenter knows how easy it is to work, and when used dry it will last a great length of time. So much wood being left on the dock quays and consequently not accounted for in the following figures so far as this year is concerned, it is necessary to be cautious in arriving at conclusions, but so far as 1872 and 1873 are in question, the figures may be relied upon.

	Pieces. 1874	Pieces. 1873	Pieces. 1872
Colonial pine deals and battens .....	868,000	647,000	818,000
Colonial spruce deals and battens	334,000	265,000	333,000
	Loads.	Loads.	Loads.
Colonial pine timber	3,700	4,500	6,800

#### IMPROVED LIMEKILNS.

A PATENT for an improved limekiln has been brought out by Mr. P. W. Spencer, of Lothersdale, near Leeds, and as it is an essential departure from the ordinary construction of kiln, we will briefly describe it. At present the fuel and limestone are fed at the top of kiln, and there is an amount of heat wasted thereby. The invention obviates this by allowing the introduction of the fuel to be lower down, through the sides of the shaft of the kiln. The object is attained by forming a dome, with an opening in the crown or arches merely at the level desired to introduce the fuel. A number of passages are also formed into which the fuel is supplied, these inlets being arranged at suitable distances apart. These inlets or passages insure a more complete combustion of the fuel; the limestone being over the fire absorbs the heat. In the drawings accompanying the description of the patent, a vertical section of this improved kiln is given, and we may describe it as consisting of two curvilinear vase-shaped chambers with a connecting passage or throat between for the descent of the limestone; the lower dome having a series of apertures obliquely made through it from arched passages in the masonry or brickwork through which the fuel or coal enters the kiln. By this arrangement there is a sufficient depth of limestone to absorb the liberated heat, the gaseous products escaping at the top at a low temperature. "The air to supply combustion rising through the lime in the lower part of the shaft, cools the lime, and prepares it for drawing; whilst at the same time it becomes heated before it reaches the fuel."

A section is given by the patentee showing how, instead of a dome, arches may be thrown across the shaft of kilns, for the same object. We think, from the description before us, the author has hit upon a good method of utilising to the utmost the fuel and heat. We believe the substitution proposed would materially improve the efficiency of limekilns, where the heat is necessarily wasted through the shaft, and the fuel ineffectually employed.

The Metropolitan Board of Works will, on Friday next elect a District Surveyor for the Southern Division of Islington in the room of Mr. G. Godwin F.R.S., who has resigned. Candidates must be between 28 and 60 years of age, and all applications must reach the office of the Board by 4 p.m., on Wednesday next.



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## OUR LITHOGRAPHIC ILLUSTRATIONS.

## KEYINGHAM SCHOOLS.

KEYINGHAM is a small village in Holderness, about ten miles from Hull, and the schools we illustrate this week are being erected under a precept from the Education Department, the existing schoolroom being a small, ill-contrived and badly-ventilated structure built about forty years ago. The new schools are situated in the centre of an irregular plot of ground having an area of about 1,300 square yards facing the Salter-road, in the outskirts of the village. They are to accommodate 110 children, viz., 75 boys and girls, and 35 infants, with separate entrance and exit for boys. A board-room for meetings forms part of the arrangement, and a safe is also provided for. The teacher's residence has three bedrooms. The buildings are faced with white bricks from Wallingfen, with red stock bricks for dressings. Very little stone is used, and there is no plaster in the schoolrooms; but the sides are boarded to a height of 4ft. 6in. from the floor-line. The upper compartments of all the windows are made to open, and channels are carried up by the side of the smoke-flues for extracting foul air. Suitable out-buildings are provided in the rear of the schools. The clock was the gift of the Chairman of the Board, and strikes the hours. Cost, including boundary walls and gates, but exclusive of land, £1,355. It is thought that this might be considerably lessened in a district where bricks are obtainable at an easy distance. Mr. Robert Clamp was appointed architect soon after commencing practice, after a competition with others, last year. Messrs. Atkinson and Son, of Sproatley, are the general contractors for the works, Mr. F. Gray, of the same place, being the joiner employed.

## ST. LUKE'S CHURCH, DEWSBURY.

This church is about to be erected on a hill-side, the upper portion of which is bounded by Leeds-road, one of the principal entrances into Dewsbury. It is planned on the most prevalent style of church arrangement, comprising nave, north and south aisles, transepts, and apsidal chancel. The excessive slope of the ground has been utilised by placing the clergy and choir vestries under the north aisle, with a spacious staircase at the north-west angle for use at processional services. Seats will be provided for about 600 persons, nearly all of whom will be placed in the nave and transepts. The church will be erected in delph stone, with dressings from Huddersfield quarries. Comparatively little ornament is to be used externally, more than is necessary to give a substantial appearance to the building; the principal features being a picturesque bell-turret at the south-west angle, balanced on the opposite corner by an octagonal projection, containing the stairs from the vestries. The architects are Messrs. Holtom and Cannon, of Dewsbury.

## HOUSE AT SHERE, SURREY.

We have no particulars to give of the illustration of Shere House, Surrey. Mr. F. P. Cockerell is the architect.

## SCULPTURES OF THE GERMAN SCHOOL, NINETEENTH CENTURY.

Particulars of the double-page illustration of German Sculptures will be found in Dr. Zerffi's article on p. 542.

Dr. Carpenter and Mr. Lewis Angell, C.E., have been instructed by the Royal Commissioners to investigate and report on the sanitary arrangements of the Royal Patriotic Schools, Wandsworth.

## HYDRAULIC CEMENT PIPES.

AN American correspondent has laid down some hydraulic cement water-pipes, and finds them cheap and serviceable. In his neighbourhood such pipes, when not required to be more than 2in. in calibre, are often thus made. A rod of the diameter required is used, around which the cement is placed and firmly pressed, the rod being drawn forward by the man who uses the trowel as the cement hardens so as to retain its form and not collapse. A pipe thus made may be considered as everlasting. Hydraulic lime costing from 20 to 25 cents per bushel, sand perhaps three cents a bushel, the cost will be say 25 cents per rod for digging trench, 35 to 40 (say 37½) for lime, 12 for sand, making 74½ cents per rod for trench and material. Two men will lay 25 rods or more in a day. Calling their wages 5 dol., to be divided by the 25 rods, makes just 20 cents a rod, giving 94½ cents as the total cost. Everything being counted to the filling in of the trench, one dol. will pay for a rod. This cement-pipe will be in cost about as much less than the combined tile and cement pipe as the tile will cost. Less skill is required and less cost of tools to lay the combined tile and cement pipe than is required for the pipe made entirely of cement, except in one particular; and this suggests the only really difficult thing in making the combined tile and cement pipe. The tile cannot become smaller in its diameter and thus allow the shrinkage of the cement around it to take place without making cracks in the cement, unless great care is taken to have the tile thoroughly wet and saturated with water. Lay along the bottom of the trench a coating of the cement, for the length of two or three tiles, then place the tile on this cement and press them firmly into it, taking care that they are in line with each other. Next, close the joints by surrounding the tile at their junctions with cement in a thin layer, well pressed against the tile. Allow this collar thus formed to set a little, and examine the inside of the tile to see that no cement has passed inside so as to obstruct the calibre. If any has found its way in, remove it by the use of a small iron rod having a scraper at one end. See to this as each joint is made, and lay tile only as the joints are made and cleared. Having put in place several pieces of tile (practice will soon show how many), and made the joints and cleaned them out, go on to cover all over with cement, trowelling it on hard, and using the cement as dry as possible, and making up for lack of water to make it spread easily by hard work with the trowel. Thus managed the cement will set quickly, and make a very strong pipe. Compression of the mortar is one of the things that must be secured if a strong, compact, artificial stone is to be made out of hydraulic lime and sand. Having surrounded the tile pipe with cement as directed, and made it solid and not less than an inch thick, shade the pipe, and if the weather is very warm moisten the tops once or twice the first day with an ordinary sprinkling water-pot; and before covering with earth, if practicable, let the water into the pipe, and put 4ft. or 5ft. head on and test it for leaks. If all is tight, cover up with earth. In two or three days a pipe will generally be strong enough to test. Leaks can be stopped by plastering with cement, when there is no pressure of water, and allowing proper time for the mortar to set.

All this has been necessary to show the difficulty of forming a cement pipe around an unyielding centre of tile. But by following directions the work can be done effectually. The simple cement pipe can contract and not crack—and for this reason, men who have had experience cover such pipes with earth as they make them. The best quality of cement will contract less than poorer qualities, and the less water used in mixing, and the more compression employed, the less contraction. Three parts of sharp sand to one of first-rate hydraulic lime finely ground, will, when properly handled, make a stone that, having had time to thoroughly crystallise, will be as hard as the rock from which the lime was made.

## RIVETED STRUCTURES.

SO much depends on the strength of rivets that a few results and opinions may be of use to our readers. Wrought iron, according to the most reliable evidence, is capable of resisting 23 to 25 tons per square inch, but we may take 22 tons per square inch as the average strength of the best Yorkshire iron suitable for rivets, and the best plates are about the same in strength and quality. Unless the rivets and plates are of equal strength, of course, the least resistance becomes the measure of the strength; hence there should be a proportion between the diameter and the pitch of the rivets and the strength of the plates. The rule is to make the rivets in diameter equal to double the thickness of the plate; thus the two thicknesses of plate at the lap or butt-joint will be equivalent in strength to the rivet, supposing the space between the rivet-hole and edge is not less than the rivet's diameter. A single riveted joint has consequently its breadth equal to three diameters of the rivet, or the pitch is three diameters. A reduction of metal is thus made of one-third, and the strength of the structure is diminished to that extent. Drilled holes are better than punched ones.

But this reduced strength is partially compensated for by the frictional adhesion of the plates, due to the cooling and contraction of the hot rivet, and by some engineers is considered so great a resistance as to fully compensate for the loss, or sufficient to make the joint equal in strength to the plate. Mr. Fairbairn's experiments are particularly decisive on this point. Assuming the plate's strength to be 100, the strength of the single riveted lap-joint was 56, and of a double row of rivets in zig-zag fashion 70. We here see a great gain. From these facts it will be observed that the plates of a boiler, or any riveted structure, as a girder, do not determine the strength; they are, in truth, only as strong as the weakest joints, and that any extra metal in the plates is wasted. It will be evident the great object is to make the joints equal in shearing strength to the plates, and to do this various expedients have been proposed. Perhaps the most practical is that of making the rivets of oval form, instead of round, employing the same quantity of metal, but placing the narrow part (say ½in.) so as to give a larger area between the rivet-holes.

## CHIPS.

The First Ordinary General Meeting of the session of the Institution of Surveyors, will be held on Monday, Nov. 16th, 1874, when the President, Mr. Thomas Huskinson, will open the session with an address. The chair to be taken at 8 o'clock.

The first Cabmen's shelter for Leeds will be opened shortly near the Town Hall, by permission of the Corporation.

The Cambridge Music Hall, Liverpool, has been converted into a Good Templar Hall. A lodge-room and offices have also been added at a total cost of about £4,000.

The parish-church of Tipton was reopened on Monday after restoration and enlargement of the chancel, at a cost of £1,450.

Bloxwich parish-church, near Walsall, is about to be restored and a new chancel added.

New stalls, a new stained-glass window, and a new organ have been erected in the parish-church of Halsall, Liverpool. The organ is by Rushworth, of Liverpool, from designs by Messrs. Paley and Austin, of Lancaster.

The new Foresters' Hall at Broadmead, Bristol, was opened on Monday. It has been decorated by Mr. Thomas, one of the scenic artists of Drury Lane Theatre.

The Nicholson Memorial Aisle, which has been added to Christ Church, Lisburn, was consecrated on Saturday. The work has cost £400 and has been erected from designs by Mr. Thomas Drew, C.E., by Messrs. Vernon.

Molynaux Church, Dublin, was reopened on All Saints Day, after restoration.

A new Oddfellows assembly-room was opened at Colchester on Wednesday week. Mr. H. Darken is the architect.





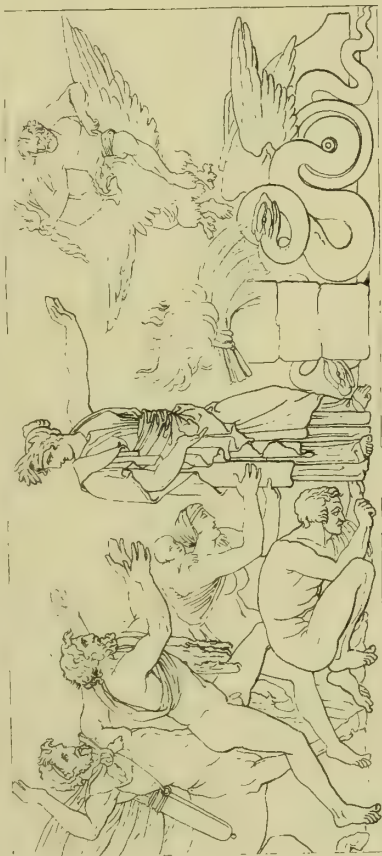








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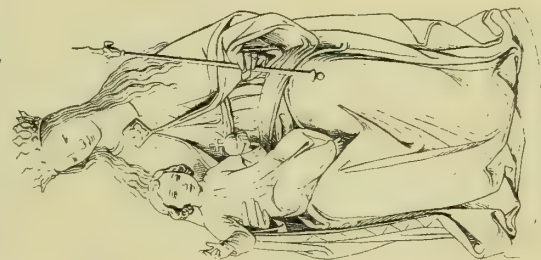
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Photo Lithographed & Printed by James Alcorn St. Grays Inn Road W. C.

# SCULPTURES OF THE GERMAN SCHOOL, XIX<sup>TH</sup> CENTURY.



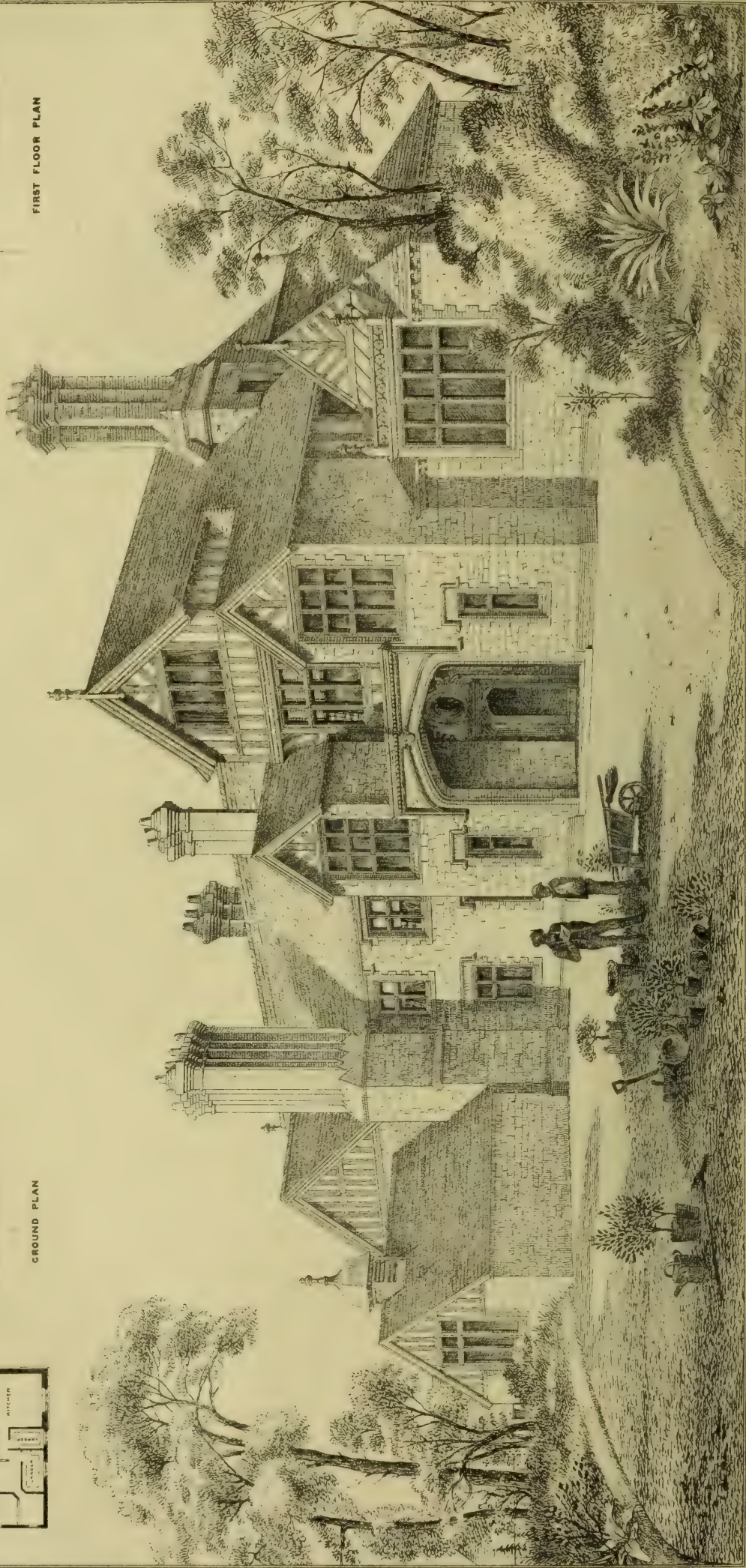








HOUSE IN COURSE OF ERECTION AT SHERE SURREY  
FOR A. CLAY ESQRE.  
F. P. COCKERELL ARCHITECT

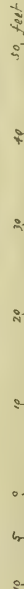








## GROUND PLAN.

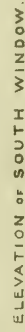
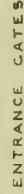
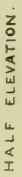


The South Stopped & Looked at American Ways in Russia



## EAST-YORKSHIRE.

20 SCALE LANE HULL



SCALE OF FEET





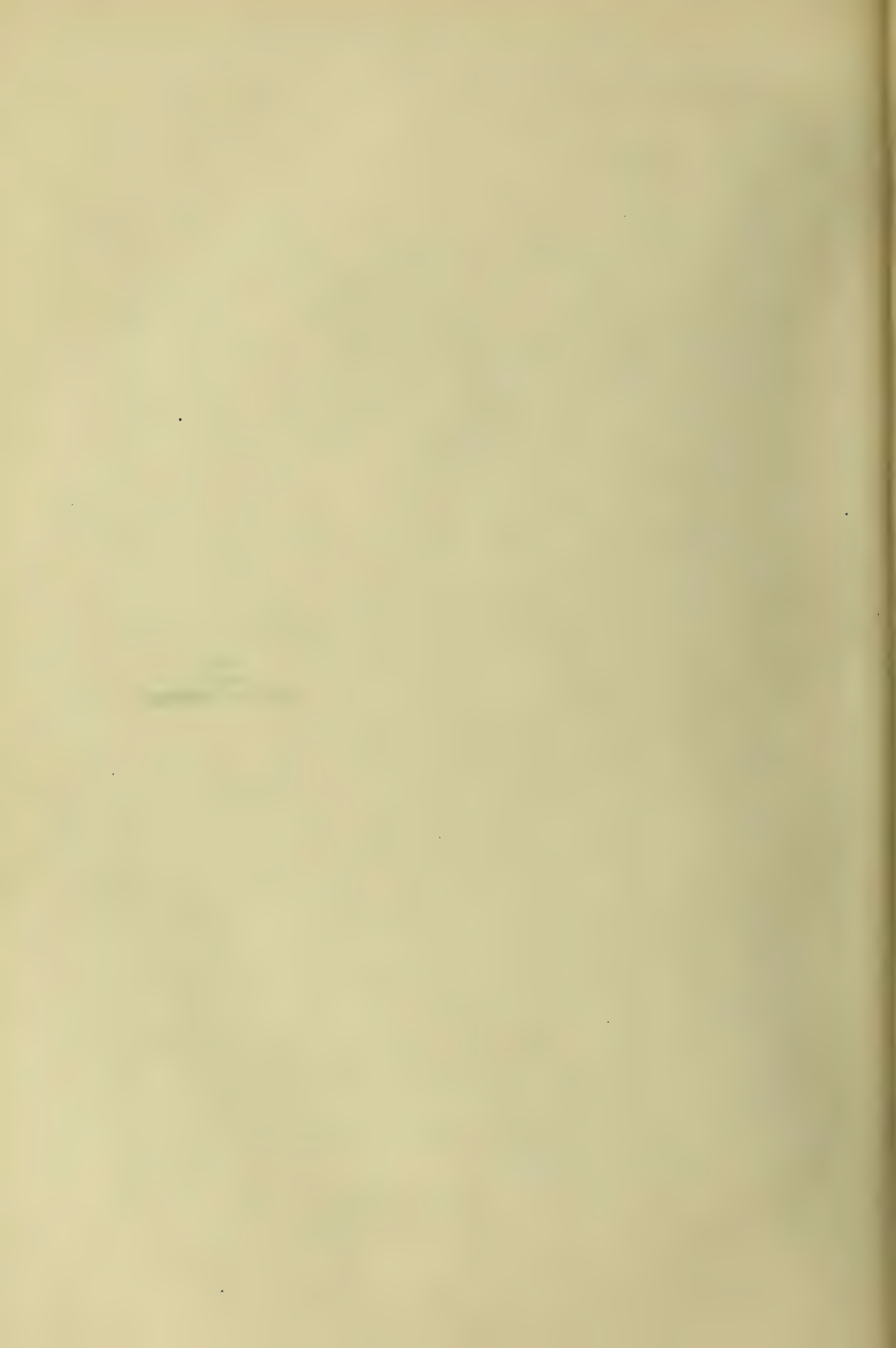




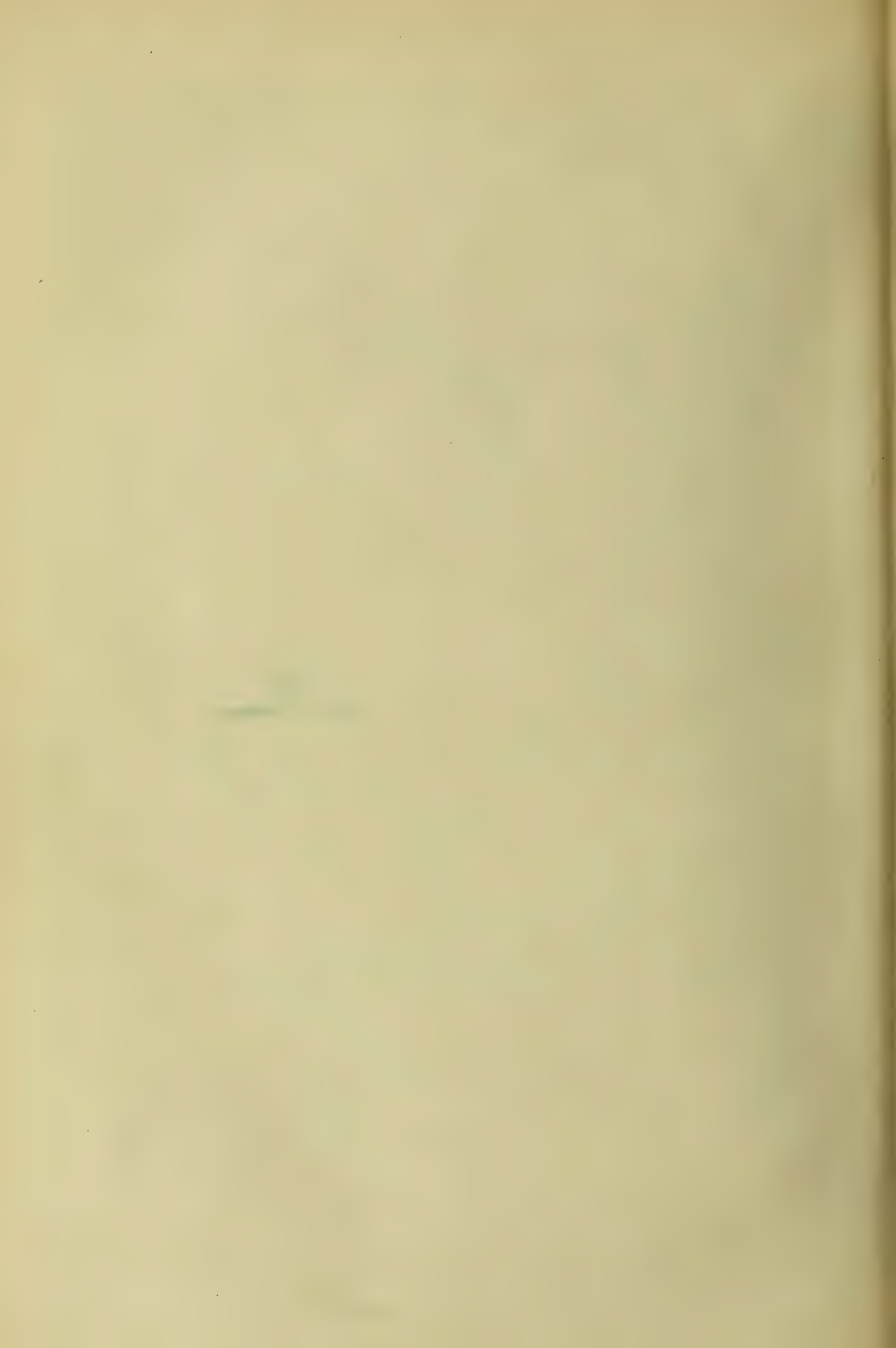


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ST. LUKE'S CHURCH, DEWSBURY.

HOLTON & GUNN, ARCHITECTS.







## A BROAD-CHURCH IDEAL OF CHURCH-BUILDING.

*(Concluded from page 512).*

BEFORE we can set about any work with a reasonable prospect of success, we must first see clearly what it is that we want to do. The mere pursuit of vaguely-imagined ends by carelessly-chosen means leads to success nowhere, and least of all in art; for success in Art, more than in most things, belongs to "people who have made up their minds." A scientific discovery may now and then have come by chance—though this has happened more rarely than is often thought; but no one ever yet produced a great poem, an admirable picture, or a noble church without intending it. Even in so slight a sketch as the present, therefore, it was necessary to begin by inquiring into the main principles we are to go upon, and by bringing out, as plainly as possible, the purposes for which, on Protestant or Broad-Church theories, churches are built. So far, the conclusion seems to be this: These purposes include no attempt to raise a shrine for the Deity; to provide a temple or an altar

"For Him whose temple is all space;  
Whose altar—earth, sea, skies."

We have only to build a house in which all may gather for common worship, and where all may learn to long for and to live a higher life. But for both these objects the noblest structure that human hands can devise and that human hands can execute will not be more than adequate. The reverence from which all worship springs will not be satisfied with mere expression in words: nor is it by words alone that noble impulses may be given, and that men may be lifted above the low and bounded horizon of the everyday world.

The first point in which our ideal church will show its spirit and intention, we may take to be this: that it will not be so planned as to make the "altar" everything. On High-Church theories, as we have just been told, "the altar is the crown of the church," "round which the richest resources of art should congregate, and towards which every line should converge": and naturally so, if that altar is believed to hold an incarnation of the Deity himself. What we have to set forth and symbolise, on the contrary, is the reverse of all this. The first thing our Church should insist on is, that it holds no visible or tangible object of worship: that "Our God is in the heavens: He hath done whatsoever He pleased": and that while reverence and solemnity befit His worship, they are not more essential at the altar than at the reading-desk—in the chancel than in the nave. But if the sacramental table is not to be everything, neither is the pulpit. The purposes of both, indeed, require them to be seen by the congregation, and to be seen far better than they are in the great majority of churches, either Modern or Mediæval; but it is a fatal mistake to make the one, any more than the other, an all-engrossing object. What we have to build is not a temple, and still less is it a lecture-hall; it is a place for united worship. It will be a failure if the congregation are shut out from the pulpit; but it will be a still greater failure if the pulpit is made the point on which every thought and expectation centres. Too commonly the Protestant church-type has oscillated between these mistakes; it has taken either a form which contradicts its own fundamental principles, by making the altar everything, or else another form which contradicts the principles of all worship, by making the pulpit everything. What it needs is neither of these things. It should raise our thoughts from earth to heaven, from man to God; it misses its purpose alike if it enchains them to a material substance on a material altar, or if it fixes them chiefly on the fellow-mortals whose part it is to counsel and instruct us. The very keynote of the design should be a pointing above and beyond what is present; our church should suggest the eternal and the

infinite, and suggest it by having no paramount object within its walls.

This thought, however, being once clearly kept in mind, we can scarcely do too much towards helping the whole congregation to enter intelligently into every part of the service. If churches are built for united worship, they should be so built that united worship can fitly be conducted in them, and if they are also built for preaching, they should be so arranged that the preaching can be heard by all who are present. The mere fulfilment of these two conditions will of itself involve a wide departure from the common type of church arrangement—a departure which will become still wider if we try to express the thought suggested in the preceding paragraph. Yet, after all that we reject in the ordinary or "High-Church" ideal, there will be much that deserves carefully to be retained. There is a "soul of goodness" in the old which can never die, having had its rise in those devout and reverential feelings which, under new forms, must still remain; of which "man was not the author, neither can oblivion ever put them to sleep." How to change all that needs changing, and yet to keep all that deserves to be kept, is no easy problem in architecture, more than in other fields of human effort. It will not be done by one man, or perhaps by one generation; but to work with this end in view, even if one fails; to try and solve the problem, even if one can do no more than show that this and that mode of solving it are impracticable,—seems to me a worthier and more useful course than to go on repeating, amidst whatever temporary applause, a type from which the life and reality have departed. Something, indeed, has been done in this direction, though not chiefly by the party who are most concerned. One modified type of church, especially—that of a wide nave with narrow side aisles—has been taken up and repeated, oftener perhaps than its real merits deserved. It gets rid of most of the obstruction to sight which commonly arises from the interference of the nave piers, and so far it is an improvement; but if used by itself, and not merely as one element of design amongst many, it cannot be looked upon as a great success. In seeking too earnestly to retain the general form of the conventional church, it loses a great part of what is really admirable in conventional church design, while it gains little that is new in place of it. On a large scale, its nave is apt to be unmanageably wide, while its aisles are so disproportionately small that one cannot help asking why they were ever built. It would be, in fact, only a short step further to have no aisles at all; to adopt, as compensation, a somewhat wider nave, and then fairly to grapple with the difficulty of its width by trying a new mode of roofing it. A very wide nave, with a mere open timber roof, can never, I think, equal in dignity of expression and sublime repose a tolerable Mediæval church. Westminster Hall shows us the best as regards general mass and total effect which we could ever hope to do in that way, and its somewhat fussy and distracted expression is not, and apparently could not have been made, anything like that which we have to desire. Even a wooden ceiling, as simple in outline as that in the nave of Peterborough Cathedral, has far more breadth and nobleness about it; and a good cross-vault would doubtless be better still. But for really wide spans, if we may generalise from the practice of the best builders all over the world, there is nothing equal to a dome; and no application of the dome is perhaps so beautiful, and so much in harmony with the spirit of early Gothic, as that which arose in the so-called "Byzantine" churches of Perigueux and its neighbourhood. Of course it is not an external dome, like that which there have been so many unsuccessful efforts to transplant from Renaissance into Gothic. The domes are used for the sake of their internal merits only, and are carried by pendentives on pointed arches. If large

aisleless churches are ever to be built (and such churches have no small advantages for Protestant worship), it is to be hoped that this promising and never more than half-developed style may be taken up and perfected. It is not, however, applicable to aisleless churches alone, but might be adapted to almost any form of plan which would allow of sufficient abutment for the supporting arches. Such plans, for instance, are those of Sta. Fosca, Torcello, St. Stephen's, Walbrook, and the crossing of Ely Cathedral, all of which have a large central area, well adapted for the use of a congregation, with minor avenues diverging from it. Such plans, again, of a different class, are those of Sta. Sophia, at Constantinople, and of the numerous buildings, large and small, which were afterwards erected in imitation of it; and such again are the simple cruciform ones, like Angers Cathedral and others of the same species. It is not now necessary, however, to pursue this question of arrangement very far. Many writers, from the late Mr. Petit onwards, have brought together valuable examples, and have thrown out more or less useful hints, for the planning of a Protestant church; the chief difficulty is to get these examples studied, and these hints adopted in actual work. It would be unwise indeed, without far more experiments than have yet been made, to pick out any one type of plan, and advocate its use in preference to all others. Probably no existing type will answer without some change; perhaps several types may be alike excellent when developed and perfected. It is enough if we discern the end to aim at: to produce a church for united worship, a church in which both pulpit and altar are visible to all, and yet in which neither pulpit nor altar are paramount; a church which turns the mind to no material object, to no visible place of adoration; but which lifts it above and beyond all earthly things to that which will remain when all have passed away.

Such a church, like some of the grandest existing churches, might well do without decoration: and for some reasons, too, it might be well to close this sketch without referring to it. But having long dreamed of the possibilities that might be realised if Protestantism would only follow its principles instead of its prejudices, I venture, with little hope of sympathy or support, to express what is likely to be an unpopular opinion. I see, then, no reason whatever why the most thoroughly Protestant church should not, under suitable circumstances, receive the very highest contributions of all the arts. I cannot understand why, in such cases, it should be denied the best music, the best sculpture, and even the best painting, that the world can produce. All these things are powers—forces to act on men's minds and mould them; and they may be employed to mould them in one fashion just as easily as to mould them in another. Catholicism and Ritualism have used, and are using, these powers for their own purposes, and are moving the world, or at least the surface of the world, by them. Why should they not be used for other purposes? Because the "High Church," mediæval and modern, has availed itself of the best music and painting and sculpture it could command, is that a reason why the Broad Church should make it a matter of conscience to have only the second or third best, or perhaps to have none at all? Because the French were beaten by the splendid organisation of the Germans, is that a reason why they should resolve on having an inferior organisation, or a mere anarchy? They evidently do not think so; and should they see fit to copy the whole military system of the Germans, they would not have the slightest fear that they were forwarding German interests by doing it. Yet one hears zealous Protestants complain that every advance in the architecture and decoration of their churches is so much gain to Ritualism. It is more than they can comprehend, apparently, that these things can be



turned in favour of Protestantism as well as against it; or, if they comprehend this, they shrink from attempting it. They have been told, perhaps, that Art addresses the senses: and they think it an unworthy thing to use. The fact is, that Art addresses the mind through one sense, and preaching addresses it through another sense; and, as long as the mind is reached, it matters little how.

Protestantism seeks to command the world: it wonders that it does not do it—that it has not done it long ago. Yet it has now witnessed a general revival of dogmas which it holds to be totally incredible; and this revival spreads, or seems to spread, ever and ever more rapidly. Why is this? Simply because it has taken up the weapons which Protestantism neglected: because it has had the sense to see that men may be ruled by their hearts as well as by their heads—by their feelings as well as by their reason: because it has understood that there are other forces in the world besides speech, and that there is a way to men's minds by their eyes as well as by their ears. It has recognised neglected facts and acted on them, and it reaps the reward. Why should not Protestantism, whose aim and glory it has been, and still is, to recognise facts—"whose open eyes desire the truth;" why should it not recognise this truth also and act on it? Men are so constituted that mere logic is not enough for them: it is not enough to din their ears with axioms and demonstrations; it is necessary besides this to influence their feelings. They are so immersed, too, for the most part, in the petty cares and projects of daily life, that all the influences that can be brought to bear are hardly enough to lift them out of these for a few moments now and then: and the question is, whether it is wise to neglect all these influences save one. Men are so constituted moreover, that they take pleasure in, and pursue after the beautiful, by whatever art it is expressed: and the question again is, whether it is wise for Broad-Churchism so to act that they can find the beautiful nowhere except in conjunction with High-Churchism in one or other of its forms. I venture to think that it is not wise. Our fundamental principle is not a mere asceticism, a "touch not, taste not, handle not:" and there is nothing in the employment either of music or painting or sculpture which in the slightest degree contravenes it. All that is necessary is that we should employ these arts to set forth and symbolise a living belief, and not an outworn tradition.

It is not necessary in these remarks to suggest details of church decoration any more than of planning. The main principle seems to be that the decoration should have a meaning and a purpose, and that the meaning and the purpose should be in harmony with those of the building of which it forms a part. We do not want mere finery, with no thought in it, and no lesson to be got out of it. If we cannot have "sermons in stones and good in everything," then the plainer our structure is left, the better. There's little fear, I think, in this age of spectrum-analysis and molecular chemistry, that anyone will make a superstitious use of works of art; but to remove all such grounds for hesitation, it would surely be enough to avoid all representations of any object of worship. The legends and the iconography of the Middle Ages we may relinquish at once; and in place of them we might begin by illustrating the Parables, the Psalms, or the Beatitudes. Perhaps the time is not ripe for so magnificent and impressive a scheme as that which was worked out some years ago by M. Lameire, though I do not know why we should not have some slight adaptation or imitation of it—say as a series of consecutive scenes or personages from Scripture history. But without asking for one subject or for another, it is enough to plead for the admission of the principle: and what is lawful being once determined on, it will be a point for consideration in each separate

case to decide what is expedient. The style should surely be a severe and reserved one: the intention should be to suggest rather than fully to realise the subjects: the treatment should be architectural rather than pictorial, and the grand object to lead the thoughts away to the realities, not to make them rest satisfied with the mere representation.

On some such ideal as this, Protestant or Broad Church Christianity might, it would seem, raise characteristic and impressive churches. Though there may be little chance that such an ideal will be fully realised in our day, it may not be wholly vain to set it before us; for "Who aims at the sun, shoots higher far than he who means a tree." When at last it stands complete, when the best thoughts of those who have followed truth are joined to the best works of those who have followed beauty, each party will see what it was that kept the other alive; and the imperishable part of each being preserved, what was mortal in them will quickly pass away. Instead of fearing, then, or lamenting over the present revival of Mediævalism, those who look beyond the passing moment should rather rejoice at it. The Middle Ages, dead so long, have come back for an hour, like a ghost from the tomb, to put us in possession of their forgotten treasures. When we have secured all the good that pertained to them, their task will be done: "their body will be buried in peace, but their name will live for evermore."

JAMES CUBITT.

#### COMPETITIONS.

TWO competitions have recently occupied a more than usual amount of attention—the Margate Drainage competition and the Hastings Town-hall competition. After many advertisements, and much discussion and correspondence, both the competitions have proved abortive, not, as far as we can see, that the competitors were at fault, but because the conditions authoritatively issued were essentially misleading. Now, the question arises, Who is responsible for these mistakes?—we do not mean morally responsible, for talking about the moral responsibility of committees, and particularly town councils, is like beating the wind. If you wish to touch a town council it is waste of time to speak of honour or conscience; it can only be touched by two things—the opinion of the public that made it, and hard dry law. Ridicule, we admit, has sometimes an influence where reason fails. Two of the competitors of the Margate competition, "Experience" and "Experientia," not only repudiate the decision arrived at, but they maintain that that decision is unjust, if not contrary to law. Whether they intend to bring the matter to a legal issue we do not know. But we trust they will not move in that direction unless they feel themselves on firm ground, or they may play into the hands of the lawyers, who generally manage to feather their own nests, whoever else may lose their plumage. With regard to the Hastings Town-hall competition, we find that, in obedience to a hint dropped by us a fortnight since, the law is to be appealed to. Let us here also express a hope that great caution will be exercised. We trust that the gentlemen who are co-operating together will well survey the ground before they commence a legal battle with a conscienceless council—the members of which are not personally liable for damages, and who can fall back on public rates to meet any expenses which may be incurred. We say conscienceless advisedly. See what this Hastings Town Council has done. It invites a public competition, with certain definite conditions. Scores of competitors in good faith spend weeks and months in preparing plans, which, at the right time, are deposited in the usual way. After a little discussion a light begins to break in on the Council that they had acted wrongly—that they had asked for de-

signs for a building to be erected for £10,000, which could not be erected for £15,000. It was then decided that the designs should all be sent back to their respective authors without explanation or apology. Had the Council taken the slightest precaution, had they consulted any ordinary surveyor, before they issued the conditions for the competition, they could have ascertained that such a town-hall as they wanted and asked for could not be obtained for the money they were prepared to pay. But having acted ignorantly they misled the competitors; and, in common fairness, they should have sent a letter of explanation to each competitor, accompanied by a cheque for loss of time and labour solely occasioned by their own false directions. The broad question now to be asked is, Is the Council legally liable for the loss and damage occasioned? This is a matter of technical law, which should be submitted to competent counsel before ulterior action be taken. On the other hand, it should not be forgotten that judges and juries are less inclined now than formerly to permit important issues to hinge on legal quibbles. Our judges particularly show a marked and praiseworthy disposition to import into their rulings the spirit of justice, and to pay a due regard to the principles of law.

#### COMPETITIONS.

THE MARGATE DRAINAGE COMPETITION.—A meeting of the Margate Town Council was held on Tuesday week to consider the present position of the Council relative to the several competitors for the drainage of the town. A letter had been received by the Town Clerk from Mr. Lewis Angell, stating that the amended plans would be forwarded to the Council during the week. A letter had also been received from Mr. Bailey Denton, another competitor, who stated that he had received an intimation from the Town Clerk that his plans had been returned, but up to the present time they had not reached him. He said he should like to be assured that no use had been made of the plans. He felt that the competitors had been unjustly treated, and that the majority of the members of the Council intended that the sewage should go into the sea from the first, and he asserted that he had competed under misrepresentation, as he was given to understand that all the plans would be fairly considered, whereas consideration had only been given to the two which drained into the sea, and which it was admitted could not be carried out. The letters from Messrs. Russ and Minns ("Experience"), and Mr. Eacchus ("Experientia"), were again read. The writers said that the Council, having failed to fulfil the conditions of the competition, had rendered themselves liable to pay for the time and money expended by the competitors in preparing their plans. In a speech of considerable length, Mr. Sear moved "That in the opinion of this Council, the claims for compensation advanced by Messrs. Eacchus, Russ, and Minns, should not be entertained." Mr. Crawford seconded the motion, which was carried unanimously. During the proceedings a telegram was handed in from Messrs. Russ and Minns, in which they stated that they had just heard that a special meeting of the council was to be held that morning, and they intimated that they should be satisfied with a fresh competition under motto.

THE DISTRICT SURVEYORSHIP OF SOUTH ISLINGTON.—At a meeting of the Metropolitan Board of Works on Friday last, it was resolved, on the recommendation of the Building Act Committee, "That the usual course be taken for filling up the vacancy in the office of District Surveyor of the district of South Islington, caused by Mr. Godwin's resignation, viz., that advertisements be issued inviting candidates for the appointment, and that the Board do proceed to the election on Friday, Nov. 13, at 12 o'clock noon; and that it be made a condition in the appointment of the new District Surveyor, that he do furnish the Board with information of those cases in which the orders of the Board, or the terms of the 25th and 26th Vict., cap. 102, with regard to the width or entrances of streets, or of projections therein beyond the general line, are not carried out, and of those cases in which the limitations of the Building Act as to cubical contents of buildings are exceeded."



## Building Intelligence.

### CHURCHES AND CHAPELS.

**HORBURY.**—On Saturday week the foundation-stone of a new Wesleyan Methodist chapel was laid at Horbury. The new chapel is intended to accommodate about 500 people. The plans have been prepared by Mr. John Shaw, architect, of Leeds. The style adopted is Italian. The chapel is to be built throughout in parpoint or Delf wallstone, the ashlar dressings being of local stone cleansed and boasted. The principal front is pedimented, having pilasters at angles, and also in centre running up to and breaking the line of the above-mentioned pediment. The chapel is 60ft. in length, and 32ft. 6in. in width.

**MIDDLESTOWN.**—The foundation-stone of a new church at Middletown, near Wakefield, was laid on the 17th ult. Mr. F. R. N. Haswell, of North Shields, is the architect, and Mr. R. Kilburn the contractor. The cost will be £3,300. The structure will be in the Early English style, and will consist of nave, north and south aisles, chancel with apsidal end, organ-chamber, choir and clergy vestries. A tower will be subsequently added, to serve as a porch, at the west end of the south aisle. The nave will be divided from the aisle by an arcade of four arches.

**OUTLTON.**—The foundation-stone has been laid of a new Wesleyan chapel at Outlton. The cost of the building will be £2,000. The building is to be used both as a chapel and school. It will be in the Gothic style of architecture, and is to afford accommodation for 350 persons. Mr. Shaw, of Leeds, is the architect.

**RATTERY.**—The parish-church of Rattery, Devon, has been reopened, after restoration. Mr. Gould, of Barnstaple, was the architect, and Mr. Barrow, of Ughborough, the contractor. The old pews have been removed and replaced by open pitch-pine benches, and the gallery at the western end taken down. The Italian sgraffito work on the walls, of which there is only one other example in the county, at Winkleigh Church, has been restored, the aisles relaid with tiles, and the screen renovated. New windows have also been put in, and the waggon roof, one of the best specimens of its kind in Devon, decorated.

**SS. PETER AND PAUL CHURCH, SWANS-COMBE, KENT.**—The quiet village of Swanscombe, three miles from Gravesend, was *en fête* on the occasion of the reopening of the parish-church, after having been closed for about 18 months, during which time a most careful conservative reparation has been carried out. The Bishop of Rochester preached. The nave, tower, and aisle of the church have been restored by Professor Erasmus Wilson, F.R.S., at a cost of about £2,000; the chancel at a cost of about £700, about £500 of which were given by Messrs Whites. The porch was rebuilt by the Freemasons of Greenhithe, at a cost of about £200. Four stained-glass windows have been given; a very handsome tomb has been erected over the family vault of Professor Erasmus Wilson, at the east end of the south aisle; and a window, stained glass, put up by the committee in memory of Professor Wilson's kindness and liberality. The church is very ancient. The font, screen, lectern, altar, altar rail, &c., are ancient. The church is well worthy of a visit, as it contains many objects of antiquity.

**WAKEFIELD.**—The parish-church of All Saints, Wakefield, was reopened on Tuesday, after restoration from designs by Sir Gilbert Scott. There appear to have been three distinct erections of the church: first, the original Norman edifice, which remained until the beginning of the reign of Edward III; second, the church consecrated by Archbishop William Melton, 1329, consisting of three aisles, stated to have been demolished about 140 years after its erection, except the cones and spire; in 1724, the south side, and about 1784 the north-east end, were entirely rebuilt, and in 1789 a vestry was added in the north-east corner of the chancel. The tower of the church is 105ft. high, the crocketed spire 135ft., and the vane 7ft. more, making a total of 247ft. This is the highest in Yorkshire. In March, 1857, a report was drawn up of the condition of the building. Sir Gilbert then recommended that the tower and spire should be undertaken first, as they were decaying

very rapidly. He also recommended the restoration of the east end, including consequent alterations in the vestry, aisles, and clerestory. He also suggested that if the church were reseated it should be done with oak, the remains of some noble ancient seats serving as a guide for the most prominent parts of the building. The total cost of the restoration, exclusive of the glass, is about £16,000. Roughly estimated, the cost will not be far below £20,000. A new reredos has been built of Caen stone and Dove marble, from designs by Sir Gilbert Scott. The recasing of the old tower and the rebuilding of the spire cost £6,600. The completion of the chancel, including the filling of the east window with stained glass, the renewal of the carved oak screen, and the laying down of the encaustic tiled floor, and the general restoration of the interior, involved a further expenditure of £4,200.

### BUILDINGS.

**DARLINGTON.**—The new Fever Hospital at Darlington is nearly completed. The plan is arranged on the pavilion system, and Mr. G. G. Hoskins, of Darlington, is the architect. The length of the principal corridor is 246ft. by 8ft. wide. Each main pavilion is 42ft. high to the ridge. The hospital, as at present arranged, will hold 44 patients, allowing to each about 144 superficial feet of area, or 2,000 cubic feet of air. The whole cost, including site and boundary inclosures, is estimated at £9,000.

**GRANTHAM.**—The foundation-stone of a new hospital at Grantham was laid last week. The hospital is to be constructed of stone, with tile roofs, and will consist of three distinct blocks. In the centre portion of the main building will be provided waiting-room, dispensary, surgeon's sitting and operating-rooms, kitchen, scullery, stores, &c., &c. The wings, stretching right and left, will provide male and female wards, each having nurse's-room, bath-room, and other offices attached. The whole is being carried out by Messrs. Hobson and Taylor, contractors, of Hogs-thorpe, near Alford, from plans and drawings by Mr. R. Adolphus Came, architect, of Mecklen-burgh-square, London.

**POWDER STORES NEAR LIVERPOOL.**—A new company has been formed recently, called the Mersey Ammunition and Powder Storage Company (Limited), and has just completed and opened magazines at Holpool Gutter, on the shores of the Mersey, near Helsby, in the county of Chester. The powder magazine is a building 77ft. long, by 53ft. wide, divided into three compartments. The ammunition store is a separate building, about 100 yards distant from magazine, and is 38ft. by 22ft. They are both constructed upon similar principles; the foundations are upon solid blocks of concrete; the whole of the buildings stand upon brick pillars and arches, set in cement, the floor being 7ft. 6in. from ground, so that at high tides the water flows under and around the buildings, to the height of 4 or 5ft., but no obstruction is presented to the ebb and flow of same; the buildings are remarkably substantial and dry; the outer walls are built with cavity in centre, and the whole of the internal brickwork is covered with boarding from floor to roof, secured with copper nails; the roof is covered with boards, felt, and slates; the floors are constructed with very strong beams; the boards are fastened with oak pegs and covered with linoleum. Ironwork has been avoided where practicable in the interior construction, and no brick or iron is visible. Both buildings are protected by lightning conductors. Corbelled platforms or balconies are carried along the full length of buildings. A hut for the employés has been erected, and strongly constructed stages jut out from the buildings to the edge of creek, for the receiving and discharging of cargoes, which will be conveyed from magazines by means of wooden trucks. The powder magazines will hold 400 tons, and the ammunition store 150 tons. The company has also built a house for the superintendent, about half a mile distant, which commands a complete view of the powder stores. They are also erecting four cottages at the nearest village, for the accommodation of part of the men about to be employed. The whole of the buildings have been carried out under the superintendence of Mr. James N. Crofts, architect, of 7, Cook-street, Liverpool. Mr. Thomas Hughes, of Chester, was the contractor for the whole, excepting the four cottages, which are being built by Mr. Thomas Davies, of Osceot, near Chester.

**WOBURN SANDS.**—On Wednesday week a new lecture-hall was opened at Woburn Sands. Mr. Roberts, of Trentham, was the architect, and Mr. Samuel Foster, of Kempston, the builder. The building is constructed of plain brick, and is in the Early English Domestic style. Its dimensions are 50ft. long, by 22ft. wide; the height is 30ft. The entrance to the building has a porch constructed principally of ornamental wood. The entire cost is nearly £800.

### SCHOOLS.

**EDINBURGH.**—The new Heriot outdoor school for the Stockbridge district is to be erected on a site at the intersection of Dean-street with St. Bernard's-crescent, of about 2,000 square yards in extent. The building is to be two stories in height. The elevations show two fronts—one facing the west, the other the south. The infant school is on the ground-floor. Entering from the south side, the juvenile school in the upper story is reached by a flight of stairs. The elevations have been prepared by Mr. Chessar, architect to the Heriot Governors. The infant-school is constructed to accommodate 200, and the juvenile 400 children, and the cost of the buildings is expected to be about £4,000.

**GNOSALL.**—The opening of new schools in the chapelry of Knightley, near Gnosall, Staffordshire, took place on Thursday week. The structure is from a design by Mr. Barratt, architect, of Eccleshall, and contains a porch, classroom, and schoolroom; the latter is 28ft. by 18ft., and the classroom 15ft. by 15ft. The building is of Gothic character, with white bricks and blue bands. Mr. Samuel Addison, of Gnosall, was the builder.

**LURGAN.**—On Tuesday week the new Watts intermediate school at Lurgan was opened. The buildings have been erected with red brick, with Dumfries sandstone dressings, and the style is Gothic. The principal gable of the master's residence is terminated by a carved owl. The sum expended on the edifice is about £3,000. Messrs. Young and Mackenzie, Belfast, were the architects, and Messrs. Collen Brothers, Portadown, were the contractors.

### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces. All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C. Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

### ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 9d. per line.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

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(Payable in advance.)

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N.B.—American and Belgian subscribers are requested to remit their subscriptions by International P. O. O., and to advise the publisher of the date and amount of their remittance. If the last-mentioned precaution is omitted, some difficulty is very likely to arise in obtaining the amount. Back numbers can only be sent at the rate of 7d. each, the postage charged being 3d. per copy. All foreign subscriptions on remittance accompanied by an additional remittance to cover the extra cost of forwarding back numbers are commenced from the next number published after the receipt of the subscription.

Cases for binding the half-yearly volumes, 2s. each.

Subscribers receiving their copies direct from the office are requested to observe that the last number of the term for which their Subscription is paid, will be forwarded to them in a coloured wrapper, as an intimation that a fresh remittance is necessary, if it be desired to continue the subscription.

RECEIVED.—J. N. and Co.—C. H.—J. and E. G.—W. H. L.

—T. W. N. R.—W. H. S.—M. E. and Co.—M. T.

JOHN EDDY (the article on "Decorative Processes" have not been separately published).—PUPIL TEACHER (We retained no design. Those we did not publish we returned. If yours is an exception, it is because we had not your address).

DRAINAGE OF TOWNS.—"Essex" had better consult Mr. Baldwin Latham's "Sanitary Engineering," or Dempsey's "Drainage of Towns and Buildings," in which works he will find all he requires.



## Correspondence.

### GROCERS' MIDDLE-CLASS SCHOOLS.

(To the Editor of the BUILDING NEWS.)

SIR,—Permit me to supplement your description of my design for the above schools, illustrated in your last issue, by adding that the drawings were submitted under the motto "A. B. C.," as this is necessary for identification.

I am anxiously looking forward for the public announcement of the list of builders' tenders for the erection of the selected design, as, no doubt, in common with many of my brother-competitors, I have grave doubts whether, in its integrity, it can be executed for the stipulated sum. My strongest reason for doubt is that the arrangement of the plan is almost identical with the one I first prepared, but which being cubed out at 6d. per foot came to £24,000, just double the sum stipulated. I was, therefore, in the face of the very stringent condition of the instructions, reluctantly compelled to abandon the scheme I considered the most perfect, for the more modest and condensed arrangement I submitted. While expressing my approval of the arrangement of the selected plan, I prefer to be silent upon its architectural and constructional treatment.

The clause of the conditions I refer to is, "The Court of the Company will take the opinion of a professional architect upon the merits of the several plans, and that plan which shall be considered the best will be adopted, the architect thereof being intrusted with the superintendence of the building and receiving as compensation for his services the usual commission of 5 per cent. In the event, however, of the court being unable to obtain a tender from a responsible contractor within 10 per cent. of the amount of his estimate, such architect will not be employed to carry his plans into execution, nor will he be entitled to any premium whatever." If the honourable Court of the Grocers' Company enforce this, I for one shall be so far satisfied with the result.—I am, Sir, &c.,

THOMAS HARRIS.

20, High Holborn, W.C., Nov. 2.

P.S.—It is somewhat singular that the selected design has not yet appeared in print.

[It so happens that the author of the selected design is like many other architects, who drink in any amount of praise, but who personally resent hostile criticism.—ED.]

### BROAD-CHURCH BUILDING.

SIR,—Mr. Cubitt's article of last week quickens in me the desire to reiterate a sentiment expressed in my paper on Churches for Congregational Uses, read at the Architectural Association some time since:—"We are not required to become theologians, although it is our duty to throw ourselves into the spirit of all classes of worshippers or teachers of whatever party, and regard the individual opinions of all who wish that the art employed should be expressive of the uses of the building."

We have champions enough for "more ornament and more ritual," and Mr. Cubitt's outspokenness for less ornament and less ritual, but more art, is very well-timed, and should "bear fruit in due season."

Mr. Street has lately represented in Congress the aspirations of that section of the church national with which his name and sympathies are associated, which culminate in the "altar of sacrifice." Mr. Donaldson put in an appearance for that section of the same church to whom the "table of remembrance" is a representative thing. Mr. Cubitt appears for the Broad Church and Nonconformists generally, with whom inquiry is thought consistent with piety, and in whose churches the pulpit is the point of attraction and chief source of edification.

Each of these churches within a church, which give it its national character, are living powers, vital organisms, replete with love and hate and fierce antagonisms, which only intensify the nearer they approach each other, and the less their differences are recognised or recognisable. To coerce either party into submission to the other would be as un-English as unwise, so that in all probability they will be "let grow together till the harvest."

But whether it be for the good or evil of religion that either High, Low, or Broad

churches should predominate, is surely not a question for the solution of architects. And their powers of design and construction are surely not to be limited to the development of buildings suitable for the expression of but one phase of the national faith, to the exclusion of all consideration for the others whose number and influence may be equal to or greater than the dominating "ism." Yet this is the direct result of submitting to fashion in art, which rides roughshod over the tenderest prepossessions of the million, who nevertheless in due time submit to be led, and are led with unreasoning and unreasonable alacrity.

It is important that an architect should understand the requirements of every phase of faith, and study to give the best form and expression in art for it. He should not require the faiths to be changed to his ideal or model church, but should know how to model his church to suit the practice or creed which comes to him for a building best calculated to develop the views of its professors, to promote the comfort of the worshippers, and the honour of the worshipped. Ritualistic churches may not be the fittest form for oratory, but it would be very arbitrary if every church were to be built only to suit the preachers.

Societies established to aid the building of churches should not narrow their views to the development of but one stereotyped form of church as a condition upon which the advances are made, as is now the custom.

If only all sides are agreed that noble buildings, nobly decorated, are acceptable offerings to God, architects will not fail to supply the art requisite to produce them, and cease to think that success in their profession depends on their "High Church," or any other church proclivities, but rather upon their freedom from prevailing fashions and power of independent thought and design.—I am, Sir, &c.,

EDWARD C. ROBINS.

16, Southampton-street, Strand,  
November 2nd, 1874.

### CURVED LINES IN ARCHITECTURE.

SIR,—In the letter by Mr. W. P. Buchan, in your last issue, he gives a simple method of drawing what he calls "an ellipse." He also appears to think that "ellipse" and "oval" are convertible terms. I would therefore beg space in your next to explain what he has probably overlooked in haste—that the figures described by compasses, which he shows, are neither ellipses nor ovals, but are "ellipsoids," or "approximate ellipses," as Mr. Tarn calls them in his valuable book.

The term "oval" can only be applied to a plane figure, similar to the section along the axis of an ordinary egg.

There are nine different methods of describing or drawing the ellipse, and three or four methods of drawing the ellipsoid. The method shown by Mr. Buchan (included in the latter category), though simple, is impracticable if the smaller diameter is a fixed dimension; and, in addition, there is an ugly elbow at the junction of the curves which becomes worse as the difference between the two diameters becomes greater.

Mr. Tarn shows a method in which the successive intersections of normals give points as centres for successive portions of the curve; but this beautiful and ingenious method, though approximating very nearly (according to the number of normals), cannot make a true ellipse. In fact, an ellipse is most simply done (without a trammel or elliptograph), by the methods described in your first article on this subject.—I am, Sir, &c.,

HUGH H. STANNUS.

### THE PICTURES IN CARPENTERS' HALL.

SIR,—I am concerned to see from a note in the BUILDING NEWS that Carpenters' Hall, London-wall, is to be demolished. In a little work of mine that appeared this spring on the "Ecclesiastical Antiquities of London and its Suburbs," mention is made of the ancient fresco paintings in this hall. They represent the building of the Ark, Josiah ordering the repairs of the Temple, St. Joseph and the Holy Child at work (the latter is gathering up the chips), and our Lord teaching in the Synagogue—the last subject in allusion to the question if the Divine Child were not "the son of a carpenter." The pictures are in a very dilapidated condition; when I climbed up to view them I heard the rats coursing behind them, and part of the series could not be seen, bales of goods being heaped up in close proximity to the wall as to conceal them (the hall being diverted from its original purpose and

employed as a storeroom by the Messrs. Waterlow). The hall itself is ancient, though patched in a miserable modern style. Every effort should be made to save the paintings. They are most interesting as a series, and appeared to me (I speak of an impression I received now six months ago) of considerable artistic value. They are, at least, part of the history of art in this country. I am greatly afraid, however, that they cannot be removed with safety. They should, at any rate, be carefully copied, the copies being facsimiles of the originals. This was done under the direction of Dr. Goodford, Provost of Eton, with a history of the Blessed Virgin on the walls of a church in Dorsetshire our Somerset Society visited this autumn. I suggested to some of the members of the society—with the whom the idea seemed to find approval—that the series might also be copied with advantage in the stained-glass of the church. May I venture to make these suggestions with regard to paintings at Carpenters' Hall:—(1) That, if possible (though I fear the rats have been before us) the paintings should be preserved and transferred to another building. (2) Failing this, that they should be carefully copied, and the copies placed in the Guildhall Library. (3) That copies, more or less modified, no doubt, but preserving the attitude and character of the figures, should be inserted in one of the windows of Guildhall itself. For any, or all of these objects, I offer a modest subscription.—I am, Sir, &c.

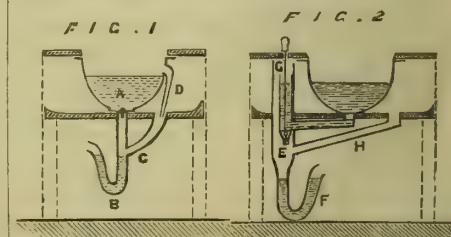
ALEXANDER WOOD.

19, Royal-crescent, Ramsgate, October 28th.

### THE PLUMBER AND HIS PIPES.

SIR,—A few days ago Mr. Wm. Hope, C.E., one of the judges appointed to draw up a report to the Social Science Congress upon the Sanitary Exhibition recently held here, addressed the citizens of Glasgow, from London, in certain very interesting remarks. With some of these I scarcely agree, however. *Inter alia*, referring to the fact that old lead soil-pipes have been taken out of houses with holes eaten through them, and also to the Glasgow practice of fitting up fixed wash-basins in dressing-rooms and bedrooms, he accuses the plumbers of ignorance, while their customers, of course, are no better. Referring also to the discovery made by Dr. Fergus, of Glasgow, about this time last year, that gases—giving them sufficient time—could pass through the water in siphon-traps (a notice of which appeared in the BUILDING NEWS, page 81, January 16th, 1874), he says: "I would beg of the rich in Glasgow to abolish remorselessly all fixed basins and other similar arrangements from bedrooms and dressing-rooms," and, as showing his own knowledge of these same fixed basins, he adds: "Perhaps some night the victim forgets to shut the waste-pipe, and so the gas enters all the more easily." Now, as regards all this, the fault, if any, does not always exist in the "ignorance of the plumber," but in many cases in the cupidity or selfishness—or, in some cases, in the ignorance—of those employing him, and also in the want of due attention being paid by the architect to the plumber-work of our houses. One great cause of bad plumbing, where such exists, is low estimates, which thus induce "scamping" to make things pay. Many speculative builders care not although there be little or none of real substantiality in their work, so being things have just sufficient "face" or appearance upon them as to catch the eye, and so sell. For the existence of this state of matters we need neither blame the architect nor the plumber, but the authorities or the law which allows such things to be. But to come back to fixed basins, where these are properly put in, with siphon-traps having, say, about 6in. of water-lock, and with waste-pipes of sufficient size, good quality, and properly ventilated, then the rich in Glasgow may continue to use them without fear; and being "rich," they have themselves to blame if nowadays their basin-stands are improperly fitted up, or their bedrooms, &c., unventilated.

As stated above, it takes a certain amount of time for the gas from the sewer or drain to pass through the water in the siphon-trap. If the pipe be ventilated it takes much longer to pass through. Now in this latter case especially, it appears to me that if the inmate were to use his fixed basin, or to run off a little cold water just before going to bed, then, with 6in. of water-lock the gas by next morning would not be half through the water in the siphon-trap, let alone considering the question, Would it be capable of doing any harm when it got through? As to the safety to be got from Mr. Hope's idea of putting in the plug or shutting down the waste-valve, that is all a delusion, as the following two sketches will easily show. Fig. 1



gives style of fitting up a plug and socket basin. Now although the plug A be in its seat it will be seen at a glance that if the gas should once get past the water in the trap B, the plug A does no good as the safe-pipe



C and the overflow D are both open. So, also, with valve-fitted basin (Fig. 2). Though the valve E be shut and water in the basin, yet if the gas once got past the trap F, the overflow-space G in the rod-pipe, and also the safe-pipe H, are both open. A knowledge of the anatomy of plumbing, therefore, shows that it is neither the plug nor the valve that is to be depended upon, but a good, well-locked siphon-trap and a properly put in waste-pipe. In certain cases all chance of danger from sewer gas could easily be avoided by either discharging the waste-pipe itself above the ground outside, or, what would look better, causing it to discharge above the surface of the water in a fire-clay siphon-trap sunk in ground and open at top, and with an iron grating over it. It is not necessary, therefore, to "abolish remorselessly" all our fixed basins, but simply to adopt proper precautions in their use. Besides, were the Glasgow people to really follow up Mr. Hope's advice, and (if I may so express it) pitch all their fixed basins out at their dressing-room and bedroom windows, they would, in order to be consistent, likewise have to throw out all their kitchen sinks, or jawboxes, at their kitchen windows!—I am, Sir, &c.,  
W. P. BUCHAN.

27, Renfrew-street, Glasgow, October 30th.

#### MR. PUGIN AND THE INSTITUTE.

SIR,—The daily press having given publicity to the fact that my name has been removed from the list of members of the Institute of British Architects, I feel sure you will kindly insert this letter in your next publication.

Since the "Pugin and Barry" controversy considerable differences of opinion have existed between myself and several of the prominent members of the Institute, so much so that my attendance at the meetings has been limited to one occasion only.

Indeed, so antagonistic has long been the prevailing feeling of the Council towards myself that on February 21st, 1868, in a leading article which appeared in the BUILDING NEWS, entitled the "Pugin-Barry Pamphlet," the editor remarked that "Mr. Pugin's courage, or rather his confidence in his cause, must have been of no ordinary kind when he agreed to submit the matter to the 'Council of the Institute.'" And added, "His father's case would not have been tried by his peers."

The truth of this last remark neither myself nor the public are at all likely to dispute, especially after perusing the singularly weak and injudicious address made by the President on Monday last.

My criticisms contained in a pamphlet entitled "The Designs for the New Palace of Justice Critically Considered," did not tend to improve matters, especially with the present President of the Institute, of whose designs it was utterly impossible to speak with admiration.

This was the position of affairs until my dispute with Mr. John Rogers Herbert, R.A., who remarked to a gentleman, whom I shall call as a witness in an ensuing action, "If the fact that Pugin has been meddling with bricks and mortar was brought before the Institute, where he has many enemies, he might get censured, which would do me considerable service. If I brought the matter forward it would look like malice, but you or some of your friends might do this for me."

Shortly after this the case of "Pugin v. Molloy" (which was decided in my favour) was heard at the Guildhall before Mr. Justice Brett, upon which the Council of the Institute, who had been previously prepared, immediately wrote for the particulars. The details of this matter are too lengthy to enter into in this letter, but they will be made public in the ensuing action of "Pugin v. Sir G. Gilbert Scott and Others."

On the 30th July, 1874, having been privately informed of the decision at which the Council had arrived, I wrote to Mr. Eastlake, the secretary, as follows:—

"The Council appear to have formed a singular interpretation of our rules which were framed for the purpose of preventing impositions by architects on their clients, and the bye-law in question stipulates not that the architect shall be prohibited from giving, but that he shall be prohibited from receiving, any benefit derived from his clients beyond his recognised commission."

"When the Council are in a position to show that I have infringed the last clause, they will then be in a legal position to carry out the bye-law 16, section 3. Should they attempt to enforce it without being in a position to do so, I have instructed my solicitor to at once commence an action to set aside their decision and to claim damages."

I may here add that an action arising from spiteful and impracticable conduct on the part of a client, cannot be brought within the rules of any corporate body. I therefore hold that the decision arrived at by the Council is illegal; and after I have proved this to be the case, I shall indict the President and members of the Council for libel.

As for the remainder of Sir G. Gilbert Scott's address, I may, without any chance of being accused of fulsomeness or sycophancy, remark that it is difficult to state whether its effect upon the public mind will not be as damaging to the dignity of the Institute as Mr. William Burges' proposed Kococo decoration of St. Paul's Cathedral would, if carried out, be ruinous to the internal effect of that grand edifice.

If, instead of discussing how it is possible to expend a million of money in destroying the solemnity of that noble work, the Council would turn their attention as

to how a direct approach from the Embankment could best be obtained, the public would at least gain something by their efforts, and one of our finest buildings would be rescued from its grave of bricks and mortar in which, sad to say, it is at present entombed.—I am, Sir, &c.,  
E. WELBY PUGIN.

Westminster, November 5th, 1874.

## Selected Correspondence.

### CANTERBURY CATHEDRAL.\*

SIR,—Many people will have been surprised at the announcement of a discovery in Canterbury Cathedral by Sir Gilbert Scott, not so much on account of the discovery as of the discoverer. They will be pleased to hear that Sir Gilbert has been invited to Canterbury, where ignorant restoration, and even worse things, have had it all to themselves for years. There are few cathedrals in England which have suffered more, and that, too, not in the last century, but in this; not fifty years ago, but fifteen, and even five. Remonstrances have hitherto had no effect. But it is possible the approaching visit of the Archaeological Institute, and terrible visions of Mr. Freeman and Mr. Parker, may have had a salutary influence. It is curious to hear so much said about a series of seats of the thirteenth century within the choir, when no one thought it worth while to remark the other day, when the continuity of a still more ancient series of seats in the choir aisle was broken to make way for hot-water pipes—a piece of destruction absolutely needless and wanton. Nor did anyone object when the new library was reared above the cloisters, though the two best views of the cathedral were ruined by the shapeless obstruction. I do not envy the feelings of Sir Gilbert when he first looked round on the "restorations" a dozen years have wrought.—I am, Sir, &c.,  
October 30.

L.

## Intercommunication.

### QUESTIONS.

[3532.]—Cable Length.—How many feet are there in a "cable length"? Hurst gives 60 yards equal 180ft.; Molesworth gives 720ft.; Weale's "Weights and Measures" also 720ft. Rankine gives the mean length of a nautical mile as 6,076ft. or at the equator 6,086ft. Now as a nautical mile contains 10 cable lengths it would appear that either 607 and 6-10ths or 608 and 6-10ths feet should be taken.—H. S.

[3533.]—Architect's Charges.—An architect having been employed to make a survey and estimate of the dilapidations to some small house-property, and also to superintend the execution of those repairs, would he be acting according to professional usage in making one charge for the survey and estimate and another charge (say the usual 5 per cent.) for his services in carrying them out?—X. X. X.

[3534.]—Calcareous Tufa.—Can any of your subscribers inform me, through your "Intercommunication" column, where the above is quarried, and in what size blocks it will average, and whether it is readily come at? Any further information would be esteemed.—ARCH.

[3535.]—Fireproof Warehouse.—I was much interested with your article on fireproof warehouses. The suggestions you give are very applicable in my case. I am about to build a warehouse 50ft. by 20ft., 5 floors, including basement, and as it will be chiefly for storing iron goods the arrangement of rolled girders and double flooring will do well. What distance should girders be apart for such a place, and what size should they be; what section?—R. R. GIBBS.

[3536.]—Separating Classrooms.—What is the best method of fixing a curtain between two classrooms to a ceiling-beam so as to be capable of opening and closing noiselessly.—A SUBSCRIBER.

[3537.]—Shutters.—Shutters to the windows of large houses are always, more or less, inconvenient, and especially so when the windows are of great width. If arranged at the sides the leverage, when opened, is a cause of their being often out of order, and if revolving there are many objections. I am told that it is now a common practice to have no shutters at all, but only well-constructed Venetian blinds, and these with good plate glass are found to be amply sufficient for all purposes. Will you kindly state your opinion in your next, or allow the subject to be discussed in your columns? As regards keeping out burglars we all know that shutters, without they are lined with iron, and made in other ways peculiarly secure, are no protection whatever.—AN OLD SUBSCRIBER.

[3538.]—Contracts.—Would Mr. Banister Fletcher, or any other of your numerous correspondents, inform me if an architect claiming under contract agreement to be sole arbitrator, be bound by the same laws as represented by your able articles on Arbitrations; or the same as if ordered by a judge, or agreed upon by mutual consent. Or can he refuse to give an award with his signature attached, and should

it be stamped. If a number of clerical errors were found in his statement, would it invalidate it? and if he had deducted items which were neither shown on plans nor in specification, what effect would this have upon his statement given but which has not his signature attached, but which he says is final as per clause in agreement?—MOFFETT LITTLE.

[3539.]—Cement for Drains.—Can anyone tell me the best cement for facing or making drain-pipes, and one that shall resist the corrosive or dissolving action of sewage matter? Are there any cement-made pipes to be had now? Some years ago, Portland cement drain-pipes were manufactured, but appeared to fall into disuse. Why?—G.

[3540.]—Polygonal or Round Churches.—I want to know what English churches there are of this form besides the Temple Church. I want English examples, with any descriptive particulars that can be furnished.—G. H.

### REPLIES.

[3471.]—Traps for Sinks.—I believe the best form of trapping a sink is to allow the pipe to discharge outside on a cesspool or trapped outlet.—G. H.

[3477.]—Indelible Water.—I procure Brakes' indelible water from Messrs. Pawson and Sylliford's, Church Gates, Sheffield. It is 1s. per bottle. There is no maker's name attached. I have not met with it anywhere else, and do not think it is much known. It answers very well for Indian ink, but I cannot recommend it for colours.—E. ISLE HUBBARD, Rotherham.

[3516.]—Zinc Roofs.—"A. B." does not say how the flat he complains of is laid. No doubt the joints are soldered, the very worst thing, as no expansion or contraction of sheet can take place under such conditions. The joints should simply lap over rolls, or be doubled at the edges, and a flat zinc cap fitted over the edges. Only zinc nails or galvanised iron wall-hooks should be used for the flashings.—G. H. G.

[3520.]—Brewery Tanks.—J. Pollard is certainly entitled to his labour, especially if he advised Portland cement, and objected to the Parian, which he says has dissolved under the circumstances named.—G.

[3523.]—Extras and Deductions.—So much depends on the wording of the contract that it would hardly be safe to venture an opinion on the points mentioned in "F.'s" query. If the contractor takes the risk of the quantities supplied, it may be only fair to suppose he takes also any advantages likely to accrue in the execution of the works, as, for example, No. 2 would, I think, come within this construction, or "work indicated on the drawings, but not executed;" and also No. 3, "work put in, but of less dimensions, or inferior quality" than specified or shown, especially as the contractor may say, in the absence of written memoranda to the contrary, that such variations were introduced in full compliance with the architect's option, although really no doubt the contractor derived the benefit. As regards No. 6 query, the contractor cannot claim for variations unless he can show a written authority or order (at least he cannot do so if the contract is properly prepared) from the architect or employer. No. 1. "Amounts particularised in the specification as being available for disbursement by the proprietor at his option, as specific sums for heating apparatus, cupboards, gas-fittings, &c.," and which amounts the proprietor has taken upon himself to pay for, are certainly deductions, the amounts having been particularised in the contract. As to work shown in the drawings but not specified, and *vice versa*, I think the contractor would have the benefit of—that is to say, if he omitted to execute them, but he could not claim for such work under the express stipulation which he signed. As I have said, the points are just those that must be decided on their respective merits, and upon the contract itself; they often arise in contracts that are not sufficiently explicit or binding. In my own practice I have found it best in such cases to adjust the matters in dispute on their own merits, or by a "give and take" system, rather than incur the expense and uncertainty of legal proceedings. Taking the question as a whole, therefore, I do not think the proprietor is entitled to deduction from the contract further than the cases mentioned under No. 1. If the proprietor claims deductions under the items Nos. 2, 3, 4, and 5, so may the contractor claim for any extras under No. 6.—G. W. G.

[3525.]—"Fors Clavigera."—Order of Mr. George Allen, Sunnyside, Orpington, Kent. It is published monthly, I think, and costs 10d. a number. To be prepaid to Mr. Allen.—W. J.

[Thomas Stone and "Scrutiny" have also answered this query.—ED.]

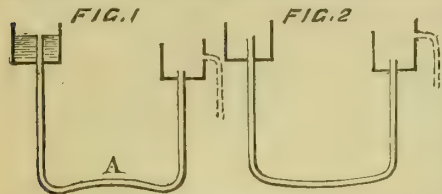
[3530.]—Hydraulics.—"N. A. H." says he has a cistern from which a 1½ in. pipe descends 17ft., traverses 35ft. horizontally, and ascends 12ft. to another cistern; and he finds the water will not run into the second cistern. The reason it does not is pretty clear: The head of water is not sufficient to overcome the friction in the small pipes; the horizontal pipe is just double the length of the descending pipe; besides this, the form of orifice at the junction with the cisterns may greatly retard the flow; thus a flat end flush with side of a cistern exercises nearly twice the resistance that a bell-mouthed pipe would; and when the

\* From the Pall Mall Gazette.



pipe projects into the cistern ever so little, the friction is increased 50 per cent. These hindrances require an extra amount of head to overcome them.—G. H. G.

[3530.]—Hydraulics.—On the supposition that the 1½ in. pipe is not choked up, I would consider that it has not been put in properly, and that air lodging in the pipe somewhere under the ground is what prevents the water from running through. Plumbers often meet with this, especially in pipes where there is not much head of water. Fig. 1 shows a pipe improperly



put in; the air lodging at the top of the rise in pipe at A keeps back the flow of the water. Were "N. H. H." to call in a plumber, he might, if it is a lead pipe, pierce a nailhole in the top of the pipe at A and let the air out, afterwards plugging up the hole with a small wooden pin, the water would then flow—unless, indeed, there were a number of ups and downs in the pipe. Another way to do it would be to connect a small air-pipe, with stopcock, to the top of the pipe at A. Still another plan, and one which might be first tried, would be to use a hand forcepump to the pipe in the higher cistern. The best plan of all, however, is, if possible, to act on the principle that prevention is better than cure, by putting in the pipe at the outset in the style shown by Fig. 2, leaving no place for the air to lodge.—W. P. BUCHAN.

#### WATER SUPPLY AND SANITARY MATTERS.

**BARNSELY SEWAGE.**—The Town Council of Barnsley, after visiting, through a committee, various places where the lime process of precipitation and other modes of disposal are adopted, have rejected the plan of precipitation propounded by Mr. Hawksley, C.E. Last month the committee made an inspection of the intermittent downward filtration work which has been carried out at Kendal, in Westmoreland, by Mr. Bailey Denton, C.E., and the council have since requested that gentleman to give them his advice upon their sewage difficulty.

**DARWEN.**—Dr. Stevens, of the Local Government Board, who has been sent down to investigate the causes of the fever epidemic at Darwen, met the Darwen Local Board on Saturday. He told that body that a few hours had satisfied him that there were ample causes for the outbreak. "The abominable filth that he had seen, the acres of uncovered excrement that they had got in the town, had never been equalled in all his experience." Dr. Stevens then went into details, which would appear to justify his sweeping condemnation of the "sanitary" arrangements of the place. He remarked incidentally that steaming in mills interfered with the health of the population.

**EDINBURGH AND DISTRICT WATERWORKS.**—After six years of contention, the Edinburgh and District Water Trustees succeeded in obtaining during last session of Parliament an Act to increase their present water supply from the sources of the River South Esk, at Moorfoot, commonly called the "Moorfoot Scheme," distant 14½ miles from the city. The first portion of the works, viz., that of Gladhouse Reservoir, called contract No. 1, has been let to Mr. William Mackenzie, contractor, Edinburgh, for £40,083. Mr. Mackenzie has become bound to have the works completed by the 31st December, 1876. The Gladhouse Reservoir is the largest of four reservoirs to be constructed under the Act, and its works consist in the formation of an embankment 1,100ft. long and 70ft. deep across the river South Esk, at Gladhouse Mill, with a waste weir 150ft. wide along its crest and channel; a lower outlet-tunnel 306ft. long by 8ft. by 6ft. through the solid rock, for the discharge of flood water during the construction of the reservoir, and eventually for the discharge of compensation water; an upper outlet culvert for the supply of Edinburgh and district with water; a sluice upstand; a measuring cistern at the outer end of the upper culvert; new roads and bridges and other contingent works, including stripping of a portion of the ground to be submerged of its turf and other vegetable matter, &c. The drainage area of the South Esk above Gladhouse Reservoir is 6,131 acres, and the surface is, for the most part, in a natural condition, the proportion of cultivated land being but small, and the style of farming simple. The reservoir itself, when full, will cover 396 acres, has a maximum depth of 63ft., and will be capable of retaining a store of water equal to six months of the calculated yield, or 1,700 million gallons. This will permit of five million gallons per diem being given off, after deducting compensation, for the use of the city and district. Messrs. J. and A. Leslie, C.E., who were the originators of the scheme, have been intrusted with the carrying out of the works.

**RHYL.**—On Monday, a long and warm discussion took place at the Rhyll Commissioners' meeting on the proposed drainage of the town. Months ago, Colonel Cox approved of a plan, but nothing has been done towards carrying it out. The members generally

agreed that the drainage of the town was in a disgraceful state, and that unless something was done the town would lose its popularity. Eventually it was agreed that the necessary arrangements for the drainage of the town be made forthwith. The scheme is likely to cost £8,000.

#### LEGAL INTELLIGENCE.

**THE PHOSPHATE SEWAGE COMPANY.**—*BEGGIE V. THE PHOSPHATE SEWAGE COMPANY.*—This was an action to recover back the sum of £15,000 paid to the Company for the "sole and exclusive right" of using a process of theirs for the conversion of sewage into manure. The plaintiff had represented a company to be formed at Berlin for the purpose, and the contract was negotiated through one Hartmount on the part of the defendant Company; and the words "sole and exclusive" were inserted by him. In point of fact, there was no patent and no "exclusive right" on which the plaintiff claimed to recover the money. The case was tried at the Guildhall before the Lord Chief Justice, when the defence was that the words "sole and exclusive" had been inserted improperly without the authority of the defendant Company and in the interest of the plaintiff, and with the view of getting up the shares of the Berlin company in the market. The verdict was entered for the plaintiff, subject to leave to move the Court upon the subject. Sir Henry James moved, on the part of the Company, on Wednesday, in Vice-Chancellor Bacon's Court, to set aside the verdict. The Court granted a rule nisi.

**THE THAMES SUBWAY.**—In the Court of Queen's Bench, on Wednesday, Mr. Huddleston referred to the action *Barlow v. The Public Works Construction Company (Limited)*, tried at Guildhall before Mr. Justice Blackburn, when the jury returned a verdict for the plaintiff, damages £1,000. He moved on leave reserved to enter the verdict for the defendants, on the ground that there was no evidence of liability, and also for a new trial on the grounds that the verdict was against evidence and excessive damages. The action was for drawings and work alleged to have been done by the plaintiff, in endeavouring to float a company for the formation of a new subway beneath the Thames. The learned counsel contended there was no evidence of contract, but the jury found for the plaintiff for £1,000. Rule granted.

#### Our Office Table.

**CLOSING OF THE INTERNATIONAL EXHIBITION.**—The International Exhibition was closed on Saturday evening, not as heretofore for the season only, but according to the present arrangements, for an indefinite period. Originally it was proposed to hold a series of these exhibitions for ten years, but owing to their financial non-success, the Commissioners, at a meeting which was held some months since, decided upon curtailing their programme, and thus terminate an enterprise which they believed would have met with a more extensive public support. This is the fourth year of the Exhibitions. In 1873 the total number of admissions were—by season tickets, 42,368; by payment, 457,474, or a total of 499,842. For this year the returns, including the past week, have not been made up, but the following may be taken as an approximate result:—Season tickets, 40,900; by payment, 431,800, or a total of 472,700, or a difference of 27,000 odd. While the exhibitions have been closed in their present form, the commissioners have decided upon giving the public the benefit of their plant in another. It is their intention to hand over the south galleries to be converted into a national portrait gallery. The west galleries are to be converted into a patent museum, in which patent inventions will be exhibited. The Indian Museum, which comprises an increasing collection of curiosities, is to be removed from the India Office to the east galleries, and that portion of the building which is now known as the French Annex will become a colonial museum. The school of art for needlework is to find a home in the new Belgian Annex, and the National Training School of Cookery will take in additional space adjoining its present location. The commissioners are said to be negotiating with various departments of the government as to the disposal of other portions of the Exhibition buildings at present unoccupied.

**ASSISTANT COUNTY SURVEYORS OF IRELAND.**—The Chief Secretary for Ireland attended at Dublin Castle, at half-past twelve o'clock on Monday, for the purpose of receiving a deputation from the Assistant County Surveyors of Ireland. The object was to lay before the Chief Secretary the grievance of the Assistant County Surveyors, and impressing on the Government the necessity of having a clause inserted in the Grand Jury Bill to be brought before Parliament in the

ensuing session providing for them an increase of salary and superannuation allowance. Mr. William Johnston, M.P. for Belfast, was invited to introduce the deputation, and came from Belfast in the morning with that object. The Chief Secretary expressed his readiness to receive the deputation, but there was only one gentleman representing the profession present. After waiting until ten minutes to one o'clock, Mr. Johnston said that he came for the purpose of introducing a deputation, but as there was no deputation present he would wait no longer, and accordingly took his departure. The reception of a deputation from the Assistant Surveyors was accordingly adjourned to a future day.

**PAPERS TO BE READ AT THE ARCHITECTURAL ASSOCIATION.**—The President's inaugural address, and the reports of the various classes, &c., will be read at the meeting this (Friday) evening, and the programme for the sessional papers is as follows:—Nov. 20, "Architecture and Landscape," by Mr. H. H. Statham, jun. Dec. 4, "Periods of Transition in Architectural Style, and is the present day one?" by Mr. A. Payne. Dec. 18, "The Annual Excursion to France, August, 1874," by Mr. Edmund Sharpe, M.A., F.R.I.B.A. Jan. 8, 1875, "A Brick and Concrete Church, St. Mark's, Battersea-rise," by Mr. W. White, F.S.A. Jan. 22, "On the Influence of Tradition in the Development of Gold and Silversmiths' Work," by Mr. R. H. Soden-Smith, M.A., F.S.A. Feb. 5, "Notes on the Architecture of the Brittany Coast," by Mr. R. M. Fulford. Feb. 19, "Queen Anne and other forms of Free Classic Architecture," by Mr. John J. Stevenson. Mar. 5, "Queen Anne and its Relation to the Gothic Revival," by Mr. Lacy W. Ridge. Mar. 19, "The Development of Stoneware and other Fictile Materials for Architectural Purposes," by Mr. John Sparkes. April 2, Members' Soirée. April 16, "What a Students' Course in Architecture should be," by Professor T. Hayter Lewis, F.S.A. April 30, "Timber Houses in Norway and Sweden," by Mr. F. E. Thicke. May 14, General Business Meeting, and paper on "Valuations of Property," by Mr. Banister Fletcher. May 28, "Remarks on the Details of Cast and Wrought Iron Girders, and their Application to Building Purposes," by Mr. Richard Moreland, jun., C.E. June 11, Nomination of officers, and paper entitled "Thoughts on the Arrangement and Materials of Town Churches," by Mr. James Brooks, F.R.I.B.A. June 25, Election of officers, and paper on "The Grammar of Architectural Ornament," by Mr. H. H. Stannus.

**COLUMBIA MARKET.**—Lady Burdett-Countess had really better pull down Columbia Market as soon as possible; it is a veritable white elephant to all unfortunate enough to have anything to do with it. Only the Baroness herself knows how much she has lost on this ill-advised and unfortunate project. The Corporation of London, after a vain endeavour to utilise the structure, recently returned the costly gift to Lady Burdett Countess, and have now been called upon by her solicitors to repaint and repair the market at a cost of some £1,200 or £1,500, and the City Architect and her ladyship's surveyor are to meet and square up the little amount in which the City of London is to be mulcted for having endeavoured to turn to some account this costly mistake, which never has been and never will be of use in the capacity for which it was designed.

**THE INSTITUTION OF CIVIL ENGINEERS.**—The meetings of this professional society are to be resumed on the evening of Tuesday next, the 10th inst., at the house in Great George-street, when a paper by Mr. Alex. R. Binnie, M.Inst.C.E., is to be read, descriptive of "The Nagpur Waterworks," and embracing observations on the rainfall, the flow from the ground, and evaporation at Nagpur, and on the fluctuation of rainfall in India and in other places. The subjects treated interest a large number of scientific men beyond the ranks of the engineers, so an animated discussion is expected.

**HASTINGS TOWN-HALL.**—At the meeting of competitors held on Monday last, the majority of those who submitted designs were represented. It was unanimously resolved that preliminary steps for ascertaining the liability of the Town Council should be taken, and a guarantee fund for securing the necessary expenses was entered into. As the matter appeared to the competitors to be not only of personal but of professional interest, it was resolved to ask the co-operation and assistance of the Council of the Royal



Institute of British Architects. Another meeting will shortly be held, and it is requested that any other competitors who are willing to co-operate will forward their names to Mr. Lacy W. Ridge, 23, Bedford-row, London.

**A SUBSTITUTE FOR THE COMPASS.**—Surveyors, explorers, and others—having first carefully cultivated the necessary natural conditions—will be glad to hear, on the authority of an American journal, of a reliable substitute for the compass. Professor Webster, at the late meeting of the American Association, told the story of a party that divided in the swamp, one portion of the party having no compass. The latter portion of the party was lost, and after long wandering found their way out by a singular expedient. They made use of the insect for which fine-tooth combs were invented. Putting the insect on a flat piece of wood, and leaving it to its own devices, it invariably began to move in a certain direction. This direction was followed out by the party, and they were thus led out to the northward. It is supposed that this instinctive movement of the insect is due to his seeking the way towards the greatest light. We are surprised that any scientific explanation should have been sought for. Any dirty vagabond could testify to the readiness with which the creature referred to will find its way to the *poll*.

**LEADEN WATER PIPES.**—A correspondent of the *Times*, on returning to this country, finding that a now well-ascertained case of lead-poisoning, caused in Glasgow by the action of acidulated water on lead, has revived an old question, writes that he heard lately of similar cases in Rome, where the old immense lead main tubes, nearly 2ft. in diameter, are being removed by an English Company and replaced with cast-iron ones, so well known in England. In France, also, where, as in England and Italy, lead is so largely used in domestic economy, public attention has been recently diverted by sad events to the danger of drinking water which has run through, and remained standing in, lead pipes. Several deaths having occurred in a chateau in rapid succession, a *post-mortem* examination was held, and lead salts discovered in the brains. The deceased persons had been treated for low fever, the symptoms of which, it seems, are not unlike those of lead-poisoning; since then the action of lead is often suspected in the too frequent cases of low fever. It is reported that 900, or about half the number of medical practitioners in Paris, have petitioned the Town Council and asked that in all new houses ordinary lead pipes may no longer be used for the conveyance of water. On the other hand, the Académie des Sciences has taken up the matter, and we may expect some good result from the action of this learned body. Meanwhile, it would be very interesting to know what competent men in this country may have observed, each within his own sphere, on the action of potable water on lead under various circumstances.

#### CHIPS.

New Turkish Baths have just been erected at Newcastle-upon-Tyne. Mr. James Shotten is the architect.

A new Cemetery has been consecrated at Darlington. It has cost £20,000. The two chapels are from designs by Mr. G. G. Hoskins.

Mr. Furnes, representing an English firm, has obtained damages against the city of Odessa for repudiating a paving contract.

Howwood parish-church, N.B., was reopened on Sunday after undergoing repairs, including the erection of a handsome memorial window by Mr. Henry Lee Harvey, of Castle Semple.

The new Southern Counties Club, Dumfries, was opened on Monday. The elevation is of red polished freestone and is two stories high. Mr. Starforth, of Edinburgh, was the architect.

It is said that Sadler's Wells Theatre, which has been shut up for some time, and which has only been open by fits and starts of late years, will probably be converted into baths and wash-houses for the parish of Clerkenwell.

The Leeds Royal Exchange Committee have entrusted the sculpture and the carver's work for the new building to Mr. John Throp, of Leeds, out of a selected number of sculptors and carvers invited from London and other towns.

The Free Church at Culter, near Brigger, N.B., was reopened last week after restoration, at a cost of £900. The late Mr. Thomas Bissett, of Glasgow, was the architect.

On Friday evening new Board schools were opened by Sir Charles Reed, at Saunders-road, Notting-hill. The schools have been erected to accommodate 200 boys, the same number of girls, and 300 infants. The amount charged by the contractor, Mr. Wigmore, of Fulham, for the erection of the schools was £7,000. The building has been carried out under the direction of Mr. W. De Gough, clerk of the works, and Mr. Facer, the foreman.

The ratepayers of the City of York have been polled, at a cost of about £300, on the question as to the promotion by the Corporation of a bill in Parliament for the erection of the proposed Skeldergate Ferry Bridge. There was a large majority in favour of the promotion of the bill. The plans for the bridge have been prepared by Mr. Page, the engineer, and the estimated cost is £30,000.

St. George's Church, Leeds, which has been closed for painting and cleaning for four months, was reopened on Sunday. The work has been carried out by Mr. Woodhead, and Messrs. Constantine and Co.

Dr. Steel has written to the Hampstead Vestry suggesting that they should endeavour to persuade the Metropolitan Board to make a proper bathing-place of one or more of the heath ponds. After some conversation on the subject, the Vestry appointed a deputation to see the New River Company, the owners of the water, on the subject.

On Saturday the first block of improved dwellings for the industrial poor erected at Exeter by a local company, was opened. The buildings, comprising twenty-four tenements, have been erected in different parts of the city.

The foundation-stone of a new Wesleyan Chapel was laid at Crawcrook, near Sunderland, on Wednesday week.

A new theatre was opened last week at Bedlington, capable of accommodating 1,000 persons.

A new Liberal Club House, which has been built at a cost of £4,000, by Mr. W. Agnew, at Pendleton, one of the townships of Salford, was opened on Saturday evening.

The death is announced from Rome of W. H. Rinehart, of Baltimore, the sculptor.

The new (Roman) Catholic church of St. Lawrence, Birkenhead, was opened on Monday. Before the new structure is completed a chancel 45ft. long will have to be added, which will make the building 145ft. long and 60ft. wide.

The Belgian journals mention the death, at the age of ten years and eleven months, of Frédéric van de Kerkhove, a young painter of almost miraculous precocity. He was a native of Bruges, and had executed not less than 350 pictures. M. Siret, director of the *Journal des Beaux Arts*, has proposed that there should be a public exhibition of his works.

On Wednesday week the new Church schools recently erected at Wittersham were opened. The style is mixed Gothic, the material blue rock stone, banded with red tile crossings in cement, and faced with red brick, the walls being 17in. thick. Mr. A. A. G. Colpoys, of St. Leonard's, was the architect, and Mr. James Holt, of Stone, Oxney, the builder.

Mr. John Statham Davis, architect, Birmingham, has the following works in progress, viz., Gothic houses at Birmingham, Balsall Heath, and Moseley; alterations to building (late residence of "Little Sisters of Poor"), Birmingham; and five houses at Aston, in the Classic style. The aggregate cost of the above works will be over £5,000.

The class of Construction and Practice of the Architectural Association, will meet November 13th, 1874.

Great Gonerby church is about to be restored, at an estimated cost of £1,230. 16s. 8d. Mr. W. Thompson, of Grantham, is the architect.

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Iron Doors and Safes;  
IRON LININGS, SHELVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB AND SON,  
Makers to the Bank of England,  
57, St. Paul's Church-yard, E.C., } London.  
And 68, St. James' street, S.W.—[ADVT.]

#### MEETINGS FOR THE ENSUING WEEK.

TUESDAY.—ANTHROPOLOGICAL INSTITUTE.—(1). "Report on Anthropology at Belfast," by Mr. F. W. Rudler, F.G.S. (2). "Report on Anthropology at the Oriental Congress London," by Mr. Hyde Clarke. (3). "Report on the Congress of Anthropology and Prehistoric Archaeology at Stockholm," by Mr. H. H. Howarth. (4). "On a Series of Flint and Chert Implements from Patagonia," by Col. Lane Fox, V.P.S.A. 8 p.m.

INSTITUTION OF CIVIL ENGINEERS.—"The Napier Water-works, with Observations on the Rainfall, the Flow from the Ground, and Evaporation at Nagpur, and on the Fluctuation of Rainfall in India and other places," by Mr. Alexander Richardson Binnie, M.Inst.C.E.

## Trade News.

### WAGES MOVEMENT.

DROGHEDA.—A strike is at present pending in the operative house-painting trade in Drogheda. The strike is not general, only affecting the relations of the men with one employer, and is not for a rise of wages, but to resist a decrease of 4s. per week below what he has heretofore paid, and which other employers are paying at present.

LORD PENRHYN'S QUARRYMEN.—THE AWARD.—The award of Mr. Wyatt and Major Matthews, the arbitrators, in the strike at Lord Penrhyn's quarries, was made public on Wednesday afternoon. The arbitrators, while blaming the men for having ceased work so suddenly, and without reference to the arrangement made at the close of the previous strike, that all complaints against the management should first be investigated by the supreme manager, find that the whole of the charges made against the managers of not having adhered to the arrangement with Mr. Lloyd, have, with one or two exceptions, been proved. The men were to hold a mass meeting yesterday to decide upon the course to be taken by them. It was understood that they would not resume work under the present manager. The strike has lasted four months.

NEW ZEALAND.—A correspondent and subscriber writes to us advising intending emigrants to New Zealand in the building trades to stay at home. He says carpenters and other mechanics are glad to be allowed to work on the roads at five shillings a day. Since the last ship arrived wages fell two shillings a day, and (Aug. 19) two more ships are shortly expected. Provisions are very dear, and people are worse off than those at home.

## The Timber Trade.

Wholesale prices of timber, deals, &c.:—  
Per superficial foot.

	s.	d.	s.	d.
Honduras mahogany, cargo avege.	0	4	0	5½
Mexican "	0	4½	0	5½
Tabasco "	0	5	0	6
Cuba "	0	6½	0	10
St. Domingo "	0	7	0	10
" "	1	0	2	0
Cuba cedar "	0	4½	0	5
Honduras cedar "	0	3½	0	4½
Australian "	0	3½	0	4½
Pencil "	0	2	0	3½
Italian walnut "	0	4½	0	5
Canadian "	0	3	0	4
Bird's-eye maple "	0	5	0	7
S. Domingo satinwood "	1	0	1	6

Per ton.

	£	s.	£	s.
Bahama satinwood "	7	0	9	0
Rio rosewood "	14	0	20	0
Bahia "	12	0	18	0
Puerto Caballo zebra wood "	7	0	8	0
Ceylon ebony "	12	0	18	0
African bilt "	12	0	15	0
Lignum Vitæ "	6	0	10	0
Cocuswood "	5	0	7	0
Turkey boxwood "	5	0	16	0

Per 120 12ft. 1½ by 11.

Geffe, 1 & 2 yellow	4 by 10	14	0	14	5
" "	3 by 9	15	10		
" "	2 by 7	14	0		
" 3rd "	4 by 10	12	15		
" "	3 by 9	13	15	14	10
" "	2 by 8	12	0		
" "	3 by 11	13	15		
" "	3 by 8	12	10		
" "	2 by 7	12	0		
" 4th "	4 by 11	12	10		
" "	2 by 9	12	10		
" 1 & 2 white	3 by 9	11	0		
" 3rd "	3 by 9	9	10	10	0
Archangel, 1st yellow	3 by 11	15	10		
" 2nd "	3 by 11	13	0		
" 3rd "	3 by 11	12	0		
Petersburg, 1st yellow	3 by 11	14	10	15	0
" "	3 by 9	14	10	15	10
" "	3 by 7	14	0		
" "	1 by 7	12	0		
" 2nd "	3 by 11	13	0		
" "	3 by 9	13	0		
" "	2½ by 7	12	0		
" 1st white	3 by 11	12	10	12	15
" "	3 by 9	11	10		
" 2nd "	3 by 9	10	10		
Wyburg, 1st yellow	3 by 9	13	10		
Wista Warf, 1 & 2 yel.	4 by 9	15	0		
" "	2½ by 7	13	5		
" 3rd "	4 by 9	14	0		
" "	2½ by 7	12	10		
Narva, 2nd white	3 by 11	10	10		
" "	3 by 9	10	0		
" 3rd "	3 by 11	9	10		
" "	3 by 9	9	10	11	15
Kramfors, 3rd yellow	3 by 10	13	0		
" "	3 by 8	12	10		
Bjoineborg, 1st "	3 by 9	11	0		
" "	3 by 7	11	0		
" 1 & 2 "	4 by 8	11	10		
" "	3 by 8	11	0		



Gothenburg, 3rd yellow	4	by	9	13	10	
"	3	by	9	14	0	
"	3	by	7	11	10	
Holmsund, 1 & 2	4	by	9	14	10	
"	3	by	8	12	10	
"	4	by	9	13	10	
"	2	by	9	14	0	
"	3	by	8	12	10	
Sundswall, 1 & 2	3	by	9	14	10	
"	2½	by	8	13	0	13 5
"	3	by	9	13	10	
"	2½	by	7	11	10	
Soderhamn, 1 & 2	2½	by	8	14	0	
"	3	by	9	14	10	
"	3	by	7	13	0	
"	3	by	9	12	10	13 10
"	3	by	7	12	0	
Riga, crown white	3	by	9	11	5	
Merane, 1st yellow	3	by	9	16	0	
"	2nd	by	9	13	0	
Sandarme, 4th yellow	3	by	11	12	10	
Husum, 1 & 2	4	by	9	14	10	
"	3rd	by	8	12	10	
Pitch pine				12	10	

Per 120 12ft. 2½ by 6½.						
Dram, 2nd yellow	2½	by	6½	9	15	
"	3	by	6½	7	15	8 0
"	3rd	by	6½	8	15	9 10
"	3	by	6½	8	5	8 13
"	3rd white	2½	by	6½	7	10
Drontheim, 2nd white	2½	by	6½	8	5	8 10
"	3rd	2½	by	6½	8	0
Laurvig, 3rd	2½	by	6½	7	15	8 0
Per 120 12ft. 3 by 9.						
Quebec, 1st spruce				18	0	18 10
"	2nd			14	10	16 0
"	3rd			14	10	15 15
St. John's unsorted spruce				14	15	15 5
Three Rivers, 1st				18	10	

Flooring, per customary square.						
Best yellow	1½	by	6½	18	9	s. d.
"	¾	by	7	13	0	s. d.
"	¾	by	6½	12	6	12 9
"	1	by	5	10	9	
Second	1½	by	6½	16	6	15 0
"	1	by	7	14	0	
"	1½	by	6	15	9	16 0
"	1	by	6½	13	0	
"	1	by	6	12	9	
"	1	by	6½	13	0	
"	¾	by	7	12	6	
Third	1½	by	6½	10	0	
"	1	by	6½	16	0	
Best white	1	by	5	11	0	11 3

Per cubic fathom.						
Petersburg lathwood				9	15	£ s.
Riga, &c.				7	15	£ s.
Dantzlg				7	0	10 0

Per cubic load.						
Pitch pine				75	0	s. d.
Pitea, balks				50	0	s. d.
Baltic crown fir				90	0	85 0
"	best middling			80	0	52 0
"	common middling			55	0	90 0
"	crown oak			110	0	65 0
"	brack			105	0	160 0
Quebec oak				140	0	160 0
Indian teak				220	0	280 0
Stettin				60	0	70 0
Swedish				60	0	65 0
"	small			50	0	58 0
"	balks			40	0	55 0
Quebec, large yellow pine				110	0	130 0
"	waney board			110	0	130 0
"	small			80	0	90 0

Per 40ft. 3in.						
Dantzlg crown deck deals, 3in.				19	6	
"	under 3in.			16	9	
"	crown brack			14	6	

Per foot run.						
Norway poles				0	1½	0 1½

Quebec pine deals continue at about the same price as last quotations, but it will require the lapse of a week or two before the fresh arrivals are brought prominently into the market.

## WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay.—For samples and further particulars, apply to the MANAGER, at the Quarries Narberth-road, R.S.O.—[ADVT.]

## TENDERS.

BIRMINGHAM.—For the erection of house, shop, store-rooms, coach-house, and stable, and other out-offices in Lawley-street, for Mr. William May. Mr. J. Meggett, architect, Camden-street, Birmingham.

Horsley Bros. (accepted) £520 0 0

CHELSEA.—For the construction of new sewers in Radnor-street, Shawfield-street, and Cadogan-place, Chelsea.

Chapple	£2,900	0	0
Feltham Bros.	1,991	0	0
Pizzey	1,985	0	0
Pouter (accepted)	1,983	0	0

CLAPHAM COMMON.—For alterations and additions to Bocket House, for Mr. S. W. Cawston. Messrs. E. Habershon and Brock, architects, 37, Bedford-place, Russell-square.

Sharpington and Cole	£1,670	0	0
Carter and Son	1,655	0	0
Manley and Rogers	1,570	0	0
MacLachlan	1,548	0	0
Loat and Son (accepted)	1,539	15	0

ENFIELD.—For the erection of the Enfield Cottage Hospital. Mr. Thomas J. Hill, architect, 32, City-road, E.C., and Enfield, N.

Childs	£1,500	0	0
L and W. D. Patman	1,149	0	0
Linzell	1,135	0	0
Fairhead (accepted)	1,080	0	0

HENLEY-ON-THAMES.—For new wing and alterations to Yewden, for Mr. G. C. Schwabe. Messrs. Sedgwick and Son, architects. Quantities by Mr. L. C. Riddett.

Macey	£1,225	0	0
Patman and Fotheringham	3,789	0	0
Hill, Higgs, and Hill	3,640	0	0
Adamson and Sons	3,523	0	0
Corder (accepted)	3,486	0	0

LITTLE STUKELEY.—For Little Stukeley School. Mr. Robt. Hutchinson, architect.

Smith	£377	10	0
Maile	359	12	6
Allen	344	10	6
Cade	343	0	0

LONDON.—For the erection of a warehouse in South-west-street, for Messrs. J. H. Bennett and Co. Mr. W. Seckham Witherington, architect, 127, Leadenhall-street. Quantities by Messrs. Linsell and Gifford.

Bird	£1,352	0	0
Thomas	1,294	0	0
Bangs	1,257	0	0
Elkington	1,225	0	0
Taylor	1,157	0	0

LONDON.—For rebuilding No. 39, Bedfordbury. Mr. Chas. F. Chesterman, architect, 51, Strand.

Yerbury	£600	0	0
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LONDON.—For alterations to Nos. 58½ and 587, Old Kent-road, for Messrs. Eastwood and Co. Mr. A. Freeman, architect.

Minard	£165	0	0
Thomas (accepted)	140	0	0

LONDON.—For gas services and fittings for the new branch buildings, the City Bank, Ludgate-hill, E.C. Messrs. J. Tarring and Son, architects.

Rothwell	£279	9	0
Heath	223	16	0
Benham and Sons	195	0	0

LONDON.—For heating with hot-water the St. Marylebone Presbyterian Church, Upper George-street, W. Messrs. J. Tarring and Son, architects.

Boulting	£400	0	0
Smith (accepted)	298	0	0

LONDON.—For new Catholic Church of the Martyrs, Great Prescott-street, Tower Hill. First portion of the church. For the Very Rev. Father Matthews, O.M.I. Mr. E. Welby Pugin, architect. Quantities supplied by Mr. R. O. Harris.

Downs	£10,276	0	0
Scrivenor and White	9,995	0	0
Dove Bros	9,975	0	0
Perry	9,960	0	0
Merritt and Ashby	9,926	0	0
Lascelles	6,855	0	0
Lawrence	9,639	0	0

OXFORD.—For Oxford main drainage. Contract No. 4. Mr. W. H. White, engineer.

Nowell and Robson	£36,500	0	0
Crockett	35,500	0	0
Chappell	34,469	0	0
Bugbird	34,000	0	0
Neave and Sons	33,999	0	0
Acocok	30,367	0	0
Clark	29,700	0	0
Dickinson	27,970	0	0
Cole	27,730	0	0

POPULAR.—For first portion of mission room for St. Stephen's Church. Mr. J. W. Morris, architect, Poplar.

Riddall	£350	0	0
Abraham	336	0	0
Iles (accepted)	301	5	0

ROCHESTER.—For the erection of farm buildings on the Free School Estate, Wouldham, for the Governors of the Rochester Free School Estates. Mr. J. H. Andrews, Rochester, Surveyor to the Governors. Quantities supplied by Messrs. Cowdy and Sandall.

Bishop	£1,662	16	6
Cole	1,645	0	0
Stiff	1,508	0	0
Naylor	1,493	0	0
Gates	1,393	0	0
Barr	1,385	0	0
Tollett (accepted)	1,352	0	0
Dover and Son (withdrawn)	1,203	2	0

SURREY.—For the erection of new schools and residence to be called Malden College, at New Malden, for Mr. John King. Messrs. New and Son, architects. Quantities supplied.

Macey	£2,427	0	0
Thompson and Smith	2,247	0	0
Best	2,235	0	0
Harris and Sons	2,206	0	0
Ebbs and Sons	2,200	0	0
Mark	2,188	0	0
Snowball (accepted)	2,120	0	0

WHADBOROUGH.—For farm house, homestead, and double cottage, at Whadborough, near Oakham, for All Souls's College, Oxford. Mr. Robt. Hutchinson, architect.

Lord	£1,616	14	0
Edey	1,455	0	0
Cade	1,439	7	0
Allen	1,410	5	0
Smith	1,390	0	0

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[ADVT.]

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## COMPETITIONS OPEN.

KENDAL URBAN SANITARY AUTHORITY, Dec. 15.—For laying out an estate of about 9 acres at Wattedfield. Premiums of £10 for the 1st, and £5 for the 2nd best design. Mr. J. Banks, Boro Surveyor, 100, Highgate, Kendal.

PAISLEY, Feb. 1.—For designs with specifications and estimates for the erection of a Town Hall. Premiums of £100 for the 1st, £50 for the 2nd, and £25 for the 3rd best design. Town Clerk, Council Chambers, Paisley.

ROCHESTER, Dec. 5.—For designs for houses proposed to be built on the City Garden Estate. Premiums of £30 for the best, £20 for the second, and £10 for the third best designs. R. Prall, Town Clerk, Town Clerk's Offices Rochester.

Geometrical and Encaustic Tile Pavements in every variety. Over sixty New Designs at 5s. 6d. per yard super. "The Tiles are excellent, both in quality and colour."—BUILDING NEWS. "They are of great excellence in design—the material is not surpassed by any found in this kingdom."—Art Journal. "The patterns are remarkably good and effective."—Gardener's Magazine. &c. &c. Designs and sample Tiles free on application to HENRY C. WEBB, Tiles, Worcester, London House, 114, Victoria-street, Westminster. Mr. T. Pulling, Agent.—[ADVT.]

## CONTRACTS OPEN FOR BUILDING ESTIMATES.

ACTON LOCAL BOARD, Nov. 10.—For providing and fixing 390ft. of circular, and 260ft. of straight, flat granite kerb. E. Monson, C.E., Surveyor to the Board, High-street, Acton, W.

BOARD OF WORKS, HACKNEY DISTRICT, Nov. 13.—For the supply of 50 lamp columns. Mr. James Lovegrove, Surveyor, Town Hall, Hackney.

BRADFORD TRAMWAY CO., Nov. 11.—For constructing a line of tramway along Manningham-lane. Mr. J. Kincaid, C.E., 49, Cannon-street, E.C.

CLECKHEATON, Nov. 9.—For the erection of a mill. Mr. S. Overend, architect and surveyor, Cleckheaton.

COPPOCK, Nov. 9.—For the erection of school and teacher's residence. Messrs. Barnes and Bishopp, architects, 13, Lower Brook-street, Ipswich.

ELLON, Nov. 11.—For laying pipes and constructing reservoir and other works. Messrs. J. Forbes, Beattie and Son, 2, Bon Accord-square, Aberdeen.

FALKIRK, Nov. 14.—For alterations and additions to the central public school buildings. Mr. T. B. M'Fadden, architect, 19, St. Andrew-square, Edinburgh.

GIBBALTAE, Nov. 28.—For the drainage of the southern district, and for the general water supply. Mr. E. Roberts, 5, Westminster-chambers, Victoria-street, S.W.

INVERGOWRIE, Nov. 14.—For the erection of a new public school and teacher's house. Mr. D. D. Stewart, architect, Inverhouston.

LAMBETH, Nov. 19.—For the erection of a mortuary and dead house. Mr. H. McIntosh, Surveyor, Vestry Hall, Kennington-green.

LEEDS AND YORKSHIRE LAND, BUILDING, AND INVESTMENT CO., Nov. 12.—For the erection of 19 thorough houses on the New Wortley Estate. Mr. T. Ambler, architect, 9, Park-place, Leeds.

LONG BENTON, Nov. 10.—For the erection of schools at Walker. Mr. Lamb, architect, Town Hall, Newcastle-upon-Tyne.

METROPOLITAN BOARD OF WORKS, Nov. 13.—For the formation of carriage and footway and other works in Wilderness-row. Sir J. W. Bazalgette, Engineer to the Board, Spring-gardens, S.W.

MIDLAND RAILWAY, ST. PANCRAZ, Nov. 17.—For the construction and erection of roofing over the entrance to the goods station. Engineer's Office, Goods Station, Derby.

MORLEY WATERWORKS, Nov. 11.—For alterations to the engines, at the Churwell pumping station. Mr. E. Fidler, 16, East Parade, Leeds.

NEW WORTLEY, NEAR LEEDS, Nov. 14.—For the erection of a house, cottage, and stable. Mr. D. Dodgson, architect, 16, Park-row, Leeds.

NORTH EASTERN RAILWAY, Nov. 7.—For constructing the Monkwearmouth and Sunderland Railways. Engineer's Office, Newcastle-upon-Tyne.

RAMSGATE LOCAL BOARD, Nov. 17.—For the construction of about 1,205ft. of 12in. pipe sewer, 485ft. of 9in. pipe sewer, with gullies, flushing-tanks, and street ventilators. Mr. E. Ellice Clark, C.E., Surveyor to the Board, Ramsgate.

ROUBAH AND KELTON FELL MINERAL RAILWAY, Nov. 11.—For the construction of about 3½ miles of railway. Messrs. Wadham, Turner, and Strongtham, Engineers, Duke-street, Barrow-in-Furness.

WIDNES LOCAL BOARD, Nov. 10.—For the erection of a market house. Messrs. Pierpoint, Hughes, and Pierpoint, architects, 6, Bold-street, Warrington.

EPPE'S COCOA.—GRATEFUL AND COMFORTING.—"By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected cocoa, Mr. Eppe has provided our breakfast-tables with a delicately-flavoured beverage which may save us many heavy doctors' bills."—"Civil Service Gazette." Made simply with boiling Water or Milk. Each packet is labelled—"JAMES EPPE and Co., Homoeopathic Chemists, London."—[ADVT.]

Lamplough's Pyretic Saline is refreshing, most agreeable, and the preventive of fever, biliousness, small-pox, skin diseases, and many other spring and summer ailments. Sold by chemists throughout the world, and the Maker, 113, Holborn Hill. Use nosubstitute.—[ADVT.]



## THE BUILDING NEWS.

LONDON, FRIDAY, NOVEMBER 13, 1874.

## THE RIGHT USE OF ORNAMENT.

TWO very distinct kinds of form combination are comprehended under the name of "Ornament"—one a development of the fancy or imagination, an assemblage of forms and curves of no marked significance; and the other the ideal refinement of some condition or form of structure, which latter presides over and dictates to the imagination. Both of these are dignified with the name of ornament, though the latter only can claim the title in art. Our present remarks refer chiefly to that class of ornament which places itself foremost and exacts for itself alone the place of honour, or dignifies itself under the appellation of a fine art. We cannot for a moment deny there is a good deal of ability displayed in such art, and that occasionally it honourably (?) becomes a substitute or cover for thoughtless architecture. We might name a great many instances where it does so. But this kind of substitution is not art; it cannot atone for bad form, ungraceful curvature, and improper construction; it may cover or counterfeits these, but it cannot correct them. The truth is, ornamentation of some kind or other is the vice of the age. What says Mr. Gladstone in his recent article on Ritual? He says the Greek did not sacrifice the inward to the outward show; "that method," he says, "was a glorious discovery reserved for the later, and especially for our own time." "It was the determination of their meeting point—the expression of the harmony between the two." Again, the same writer aptly says, "so-called beauty is administered in portentous doses of ornamentation, sometimes running to actual deformity. Quantity is the measure, not quality nor proportion." Again he asks, "Who shall be the rival of some English architects plastering their work with an infinity of pretentious detail, in order to screen from attention inharmonious dimension and poverty of lines?" Nothing can be more to the purpose of our remarks than this opinion. Our ornamentation lacks measure, rhythm, proportion; we have it in overdoses, without respect for architecture, and without any of that discriminating balance of the plain and enriched. It is the very vice which the Roman architects indulged in that characterises our modern ornament; it runs to excess whenever there is a place or opportunity. In the Renaissance it was the same; margins and panels of pilasters, caps and bases, cymatium, corona, and architrave, were all decorated, and even the good advice of Serlio that every alternate member should be left plain was unheeded. Only the Greeks knew how to apply ornament. Look at their anthemion, fret, egg-and-tongue, and other enrichments: they were invariably placed on the *smallest* members and surfaces; they were always conventional; but mainly they bore a very *small proportion* to the area of surface they decorated. The Romans would appear to have exactly reversed all this: the large flat surfaces as the frieze, the *faciæ* of the architrave, and even the upper members of the entablature, which in Greek examples are always plain, and simply dependent for their beauty on their proportion and subtle curves, are covered with carving, as in the Arch of Titus, and notably in the Temple of Jupiter Tonans. But, singularly enough, we find this indifference to, or rather indiscriminate, of the province of ornament taking place simultaneously with a neglect of the canons of proportion and symmetric laws. Commensurability is lost, as ornamentation increases; thought gives place to repetition, and the music of curve and outline to surface

interest. The architects and carvers seem to have lost sight of the fact that the emotions awakened by beauty are reciprocal, in which intellect as well as imagination are concerned, and that to make the latter the strongest is to take away more than half the pleasure. Ornament is relative; it is pronounced by contrast, and its effect is tenfold increased when in juxtaposition with its opposite. The law of relativity seems to be that one which is at the greatest discount among decorators and others engaged in the fine arts. They appear seized with the idea that there cannot be too much of a good thing, and, like the Ritualist, they cling to the vain hope that excess in the details is the redeeming virtue. Instead of how much, it were better if the artist considered how *little*, ornament was necessary. In proportion to its quantity we find invariably a poverty of design. The Greek sculptors displayed, probably, the very *least* amount of mere ornament; it was of the most delicate kind, and served to add to the richness of their work and that pleasure which springs from pursuit and unexpected discovery. The Greek anthemion, the guilloche, and the metopes were ornaments of this kind. Turning to the debased Roman or Renaissance, how great the contrast! We feel as if the ornamentist, in overlaying every portion of the work, intended to conceal it, to display his own art at the expense of that of the architect. This really was so. Phidias, Polycletes, and his *compères* united in producing a *whole*—individuality was merged in the great result; a grand harmony was attained. With the artists of the debased schools, it was different; the decorator and the architect were not always the same persons. Ornamentation became a distinct profession, as it is now. We at once see the change: ornament of every kind—carving, painting, gilding—are so many distinct crafts paid for by the quantity, not the quality, executed. The consequence of this is twofold. Ornamentation makes itself a purchasable rarity, and the estimate of a work is judged by the quantity it has of it—at least such an estimate is formed by the indiscriminate judge; and, again, the art becomes independent of the work it adorns—it sacrifices all constructive propriety to the individual whims and reveries of the decorator. Nearly all our decoration is of this egotistical sort; that is, when we see it introduced in an improvised or unprovided manner by the ornamentist, carver, or painter. One remedy only remains, and that is to form classes or societies of art-workmen, with the object of their education in the special kind of work they engage in, whether as stone or wood carvers, metal and fictile artists. In these societies something like a general knowledge of architecture and style and the kind of work should be given, together with a thorough acquaintance with the material worked in. We cannot expect to find art-workmen otherwise than egotistical, and proud of displaying or placarding their fancies on façades and shop-fronts, when they have to pick up piecemeal their art, or merely go through a general school of design training without definite direction of study. Such workmen are generally the proudest, and the most difficult to teach the lesson to be inculcated of mutual dependence in art-work. There are a few common principles that a stone-carver or a designer engaged in paper-hangings or carpets, or in any other kind of purely decorative work, should know. The first great principle is *purpose*. Unless a designer or a workman thoroughly understands beforehand the motive and intention of his ornament, and sees it in reference to other parts of the design he is decorating, his efforts will be thrown away. A space is left for carving and decoration, and the artist who does nothing better than fill it up is merely a labourer in his art; but he who judges of the quality and quantity, who uses his discrimination in idealising his material, in seizing upon those points which seem to spring out of

the work he has in hand, and in making them the principle upon which to work; in taking advantage of any structural feature and turn it to the best account, is, in truth, aiding the aim of the work he is engaged in, and becoming an accessory artist or architect in every sense of the term. Another element is *principle or motive*. By this we mean some basis or root, or dominant idea, that should never be lost sight of in detail. No elaboration or intricacy is pleasing unless some symmetrical arrangement or geometrical principle is visible. The rich arabesques of the Moors, and those of the Elizabethan period, are generally based on some framework more or less structural in character, to which the minor features are subordinated in a natural sequence. *Adaptation* of ornament to position is another very frequently violated rule. We often see ornament introduced that only the workman or designer at the time and place of its execution can understand. For example, irregular two-lobed flowers or foliage are placed in positions which require, to understand them, a certain point of view inaccessible by ninety-nine out of every hundred observers while geometrical forms are placed where variety of outline would have been far less monotonous and tiring to the eye. Every decorator should remember that regular figures and curves present an ever-changing variety and beauty when they are placed on surfaces viewed from various points, as a floor or ceiling. Such regular figures, then, present the two essentials of all beautiful objects namely, unity in the general design with variety in the detail; on the other hand, when symmetry and variety are combined in the single form, or in the detail, *uniformity* of view is an indispensable condition.

## COLOUR.—VIII.\*

## COLOUR IN ARCHITECTURAL INTERIORS.

OUR last article discussed the gradation of colour which should be observed in the interiors of buildings, and we briefly alluded to the quality and quantity of light admitted, or the medium through which it enters the building. We also showed that coloured glass so far affects the decorations that they lose their distinct hues and tones, primaries becoming secondaries, and secondaries tertiaries. Let us here resume the subject. There are two classes of interiors,—those which are illumined through plain colourless windows, and those which have stained or coloured glass windows. It must also be observed that these conditions cannot reasonably be altered. To substitute coloured for plain white glass, would be at once to reduce the quantity of light, and further, to decorate the interior with coloured materials would still more reduce the lighting of the building, and the strength of shadow. There may be too much, or too little light—seldom the former; and the question is, which kind of decoration—coloured glass, or coloured walls—best answers the desired effect. In the latter case we would hesitate to employ either kind of decoration, certainly not both, though we frequently find gloom preferred to light. To throw coloured rays on colour is to destroy the latter, to render its effect nugatory, and to neutralise any pleasure that can possibly be derived from it. This objection, however, does not appear to have much weight, and we have only to instance the serious intention of doing the same thing in our metropolitan cathedral under the most aggravated of circumstances, namely, by first reducing the source of light by coloured glass and then reducing all reflecting surfaces by mosaics and gesso. In such a case, if colour is needed, surely the most reasonable plan is to be satisfied with a well-assorted colour medium, just sufficient to tinge the rays of light and give a warmth and glow to the interior. But no; both means of subduing the few flickering rays that find their way through

\* Concluded from page 424.



a clouded atmosphere must be had; colour is wanted and we cannot have too much of it. This would appear to be the argument of the colour apologists of St. Paul's, if indeed, they gave the matter a thought at all.

Another objection of equal weight, and which applies more to coloured decorations than coloured-glass windows, is that not only is light reduced, but we lose a great charm of interior effect in diminishing the power of chiaroscuro or of shadow, and in applying glass or painted interior decorations, this loss must be weighed against them. No one for a moment can deny that an architectural interior receives one of its most striking artistic effects from a well-balanced play of light and shade. What a grand series of deep and soft shadows, gradation of tone and semitone, strong chequered lights and shadows, cast and reflected, are observed in most of our unpainted cathedrals! Take Winchester, Salisbury, or Lincoln, and imagine what the effect would be were their grand stone surfaces to be subjected to colour, either by frescoes or mosaics. They would lose more than half their present interest and charm as architectural works, while we should probably be substituting art of questionable merit, and with less power of pleasing. In fact, it cannot be too forcibly insisted that coloured decorations kill architecture by taking away or diminishing one of its powers of impressing us. No one can controvert the position that such decorations and architectural detail are thoroughly opposed; that where the former exists the other must be lost entirely, or so nullified as to be rendered inoperative in effect. In fact, the conditions necessary for coloured decorations are these:—*abundance of pure light, and plain wall surfaces* not architecturally treated. Under these conditions most of the Italian churches must be placed. It is unreasonable to imagine, under any circumstances, that strong coloured decorations and strongly defined architectural treatment can coexist or be otherwise than mutually subversive. We speak more here of pictures and other defined representations which solicit the interest of the spectators. In proportion as these become prominent as works of art of the painter, so must architectural interest be subjugated. Form and colour are so far distinct and separate kinds of art, that to combine the two happily, there must be a mutual surrender, or one must be entirely instrumental in giving effect to the other. We dwell on this point particularly, because there are some architects who think the highest class of architectural expression admits of a high class of colour-decoration or polychromy. What says an eminent authority already quoted: "If painting has from the beginning really concurred with architecture, and even with painted sculpture in the interior decoration of Gothic churches, it can only have been in a secondary degree, and on the system of flat tints, from the time when stained-glass windows were put in." Here we have a decided expression affirming the kind of coloured decoration that is consistent with architecture; viz:—flat tints.

But let us quote further: "For no painting applied upon an opaque body, as stone, could sustain itself beside the brilliant coloured light transmitted by the glass." Had this (he says further) painting been graduated by chiaroscuro, its merit would have been entirely obliterated for want of a white light. Again, Chevreul says, "After reflecting upon the deep impressions I have received in great Gothic churches where the walls present only the simple effects of light and shade upon a uniform surface of stone, where there are no colours except those transmitted by the stained glass, I say that the sight of more varied effects would have appeared to me an error against the principle of suitability of the place to its destination."

Regarding then the subject in a broad light, and supposing some interiors are enhanced by

the effect of colour, we are led to the conclusion that such colour is best transmitted through the medium of glass, taking other equally powerful effects into notice. The only alternative wall decoration is, that in which the pictures are perfectly flat, and as simple as possible, or plain flat tints of monochrome hue. To place pictures, highly coloured and relieved, on walls exposed to coloured light, they must be subject to all the defects of admixture we have spoken of; but where they are so exposed, the colours should be in such proportions as will produce white light, or as nearly so as possible, and they should always be executed with reference to the transmitted light of the stained glass.

When white glass windows are introduced, and the light is ample, the case is a little altered. The employment of frescoes, coloured sculpture, marbles, porphyry, granite, mosaics may adorn the walls and floors, as we see in St. Peter's. However, as Chevreul remarks, it is not enough to have choice materials as woods, marbles, metals, and pictures; they should harmonise with the character of the place; be subservient to the architectural effect. The artist must "avoid putting coloured marbles contiguous to the white stone of which the walls are composed; he must also proscribe surrounding bas-reliefs in white stone with slabs or borders of red or green marble." Generally, we have two classes of interior: one with coloured glass, which itself tints and tones everything that receives the rays. Such interiors are pictures in themselves, and need no further decoration; secondly, we have interiors with white glass windows, and here, within the limits pointed out, the painter and decorator can exercise their powers, always keeping in view the purpose of the structure, the quantity of light admitted, and the architectural detail. The first kind of interior seems to satisfy the demands of the highest architecture; while the second appears to be appropriate when the architecture requires the illusory effect of the painter's art to render it more perfect.

In conclusion, let us refer to Nature and her great adapter, Art. Nature, our great teacher, shows a gradation of colour in all her works; she has distributed it in varying proportions from the Poles to the Tropics, and we may gather a lesson or two from this distribution. Amid the Polar regions of eternal snow, we find a decided absence of colour—all is white and grey; no brilliant-tinted vegetation, no variegated plumage of birds, but both vegetable and animal forms are all clothed in white or grey. Towards temperate climes colour begins to manifest itself, both in vegetation and animal life; while, coming to the southern parts, the sky is of deep azure, the vegetable world puts on a raiment of varied hues, till, in the Tropics, the gorgeousness of colour in brilliant and prismatic intensity reaches a climax. This paucity of colour in the Polar regions, and the lavish profusion of it in Tropical countries, may be explained by physical laws. It would be as discordant to see the jewel-like and brilliant plumage of birds and winged insects in Arctic regions as it would be to see the colourless objects of northern skies in southern latitudes. The intensity of the solar rays is the secret of this varying distribution of colour. Imagine the feeble light of a Polar sun absorbed in bright colouring, or the brilliant intensity of the Tropical sun unsubdued by the brilliant hues of South American plumage and the jungle swamp. The deep and contrastive shadow cast beside the intense glare of an Italian sun would be unbearable but for the modifying effects introduced by dark colours, while the reversal of these conditions would be equally inharmonious. In the adoption of polychromy by the Egyptian, Assyrian, and other Eastern nations, the law of Nature has been intuitively followed. The temples of the south of Italy, Selimuntum for example, have shown in one or two instances traces of colour. Of the entablature, the lintel of the

architrave is red, the guttæ blue; the triglyphs show blue on their face, the channels black; the astragals of columns are red; the ground of the metopes blue. Yellowish tints are also found on the surfaces of the walls, which were coated with a fine stucco of that tint. Learned antiquaries, and among them M. Hittorff, in his "*L'Architecture Polychrome chez les Grecs*," have endeavoured to show that the Greeks employed polychromy to a great extent. How far they did so is a question not yet answered; but, on the authority of Mr. Penrose and others, it is very doubtful that the Greeks employed so lavish a use of colour as some have contended in the Parthenon. It is indeed highly improbable that the beautiful Pentelic white marble used in the Parthenon, and obtained at great cost, should have been coloured or painted, as asserted by the apologists of polychromy. As Mr. Penrose says, if colouring or painting was intended, the marble of Hymettus rather than that of Pentelicus would have been used, as less costly and more easily quarried than the Pentelican. The traces of colour found are upon the soffits, coffers, and the smaller ornaments, the larger parts and surfaces showing no decided proof of positive colours, as some have suggested, while the ornaments found painted are so small and delicate that without the aid of colour they could hardly have been seen.

In interior decoration art may become more illusive; colour may be employed to give apparent extension, and pictures to aid the imagination and to enlist its interest. Ordinary framed pictures do this in a certain measure—they give to the limited size and proximity of the walls an idea of expansion by the multiplication of ideas of interest. To subdivide the wall-space embraced by the angle of vision, or make it full of matters upon which the imagination can wander, is one secret of the artist's success, but no large masses of colour or pictures will do this. There must be a combination of receding planes of colour with the help of detail of darker colour to attain the effect, while in large interiors there must be the balance also of the prismatic hues or tints to create a similar extension or sobriety of effect. Neither in large nor in small interiors can we afford to lose extent, and all the illusion of art should be directed to increase rather than diminish this element. One object of decoration is to serve essentially as a size magnifier by giving variety and multiplicity of parts. Pompeian decoration shows to what extent the ancient artist went in this subdivision of parts to obtain scale. The ceiling of the Sistine Chapel also shows infinity produced by subdivision, while in St. Peter's the vastness of the interior is not realised owing to the colossal size of sculpture and detail. Now this kind of illusion may be produced therefore with and without colour—with colour by a judicious distribution of primaries in the detail and secondaries in the mass, as already discussed, and without it by an artistic subdivision of parts.

## PLANTS, AND THEIR ORNAMENTAL TREATMENT.\*

(SECOND ARTICLE.)

IN our last article we pointed out some broad and important distinctions in leaf-form, with which the designer who seeks to adapt the varied forms of natural foliage should become acquainted. To take a leaf or a flower as Nature presents it to us, and to merely imitate or combine it with our work, whether it be a stone capital, a string-course, or a piece of surface decoration, is no evidence of the artist: such imitation may be done almost as well by a machine. Not only is it

\* "Plants, and their Ornamental Treatment." By F. EDWARD HULME, F.L.S., F.S.A. London: Marcus Ward and Co.



inartistic—but it is unnatural, for nature would never have combined two such opposite properties and forms. But we may be told by the imitationist to look at yonder ruin or ancient gateway, and see how the tendrils of ivy or vine clasp and clamber up the stony walls; how they nestle in the deep hollows of the moulded arch, or gather in knotty masses under the richly-membered capital. Why not, we may be asked, transmute the entwining parasite into stone or marble in the same way as Callimachus, the Greek sculptor, converted the sprouting acanthus-leaf that sprang up round the simple trophy of the Corinthian maid? The idea is extremely attractive and poetical, and highly suggestive, but that is all. The architect or carver may convert the idea, but he must do so as an artist working in stone and under a constraint imposed by the object and purpose of his work. But the fact is, it is easier to imitate the natural growth; the result is, among a certain class at least, more appreciated, and it brings its author into quickly-won repute. Not so when the natural production undergoes a mental process of adaptation—when the form merely suggests an idealisation or conventional treatment. The work then becomes representative of the mind no less than exhibiting the cunning of the artist's hand; it passes from the sphere of imitation into a creative art, and, in proportion as it does so, requires a more critical taste and judgment in its appreciation. It is a mistake to suppose nature is degraded by this conventionalising process—that it loses one iota of its power in the translation; it rather, on the contrary, appears as it probably would if the laws of natural growth had been unrestrained, if they could have developed symmetrical forms without the disturbing and inconstant action of other forces. In passing from vegetation to crystallisation, we discover greater precision and symmetry; and may we not aptly declare that to be the most natural and truthful art which takes a lesson from both these great forms of nature—forms nearly allied though standing on the confines of the Organic and Inorganic kingdoms of nature? Which, we may ask, does architecture more strictly typify? To which is it most analogous?

In our previous remarks we dwelt upon leaves and some of their distinctive characters as valuable to the artist of ornamental design. We may now notice a few other features, as the flowers and the stems of plants. In the form of the opening bud there is much suggestiveness, as in the sycamore; and in the development of a flower there is still greater variety and symmetrical beauty, which the designer can always easily appropriate to his purpose. If, in giving the beautiful examples of flower-form, Mr. Hulme had premised a simple explanation of the parts of a flower and their definition, we think he would have added considerably to the practical value of his work to students not acquainted with botanical nomenclature. Let us here supply the deficiency before proceeding further. Every flower springs from the flower-stalk called the *peduncle*, and this varies in section even in different kinds of the same plant. The flower-leaves spring from the flower receptacle. Taking a simple buttercup, we have five outer leaves called *calyx* leaves or *sepals*, as they form the calyx of the flower. Within these is another series of five floral leaves, called petals or corolla leaves, as they form the corolla of the flower. When these petals are free the five petals form a *poly-petalous* corolla. Within this second row of leaves or petals we get the third series, unlike the sepals and petals, but separate. Each of these consists of a stalk (filament) and a head (anther), and together is called a stamen. As they are also numerous, they are said to be *polyandrous*. These are the most important divisions of a flower for the ornamentist. The snowdrop is one of the simplest, yet most beautiful, forms of flower. Three white petals are inclosed within the white calyx leaves, and form with one another angles of 120°. The

term perianth is sometimes given to the flower of the snowdrop, as also to the tulip, and wherever the petals and sepals are similar in form and colour. Again, the ovary, or central organ of the flower containing the ovules, has a very ornamental section, and is termed trilobular, from its containing three cells. The common primrose (*Primula vulgaris*) has also a very ornamental and suggestive ovary section. Such forms being strictly geometrical and regular, afford to the artist a large variety of ideas suitable for corner ornaments, diapers, rosettes, &c., and require little conventional rendering to suit them to the purpose of decoration. We have bi-symmetrical, tri-symmetrical, and multi-symmetrical arrangements. The great mullein (*Verbascum Thapsus*), a plant found in sandy or gravelly soil and in hedgerows, grows to a height of 5ft.; and the most noticeable feature pointed out is the bi-symmetrical disposition of the flower of this plant, and also of all those of the same order, as in the snapdragon, foxglove, &c. As Mr. Hulme justly says, “bi-symmetrical arrangements are very appropriate in the decoration of upright surfaces, such as wall-papers, curtains which will always be seen one way, while multi-symmetrical star-like forms become more suitable for floorcloth and carpet patterns, because a star-like pattern on the floor looks equally well from all parts of the room.” This is a law of design that cannot be too often enforced, for it seems perfectly absurd to produce a pattern on a carpet as flowers or leaves so placed that at only one end and one point of the room it can be seen in a normal position.

Ruskin says “symmetry is necessary to the dignity of every form, and by removing it we shall render the other elements of beauty comparatively ineffectual. . . . A form may be symmetrical and ugly, as many Elizabethan ornaments, yet not so ugly as it would have been if unsymmetrical, but better always by increasing degrees of symmetry.” In the *Potentilla anserina* we find the units or the five petals composing the flower symmetrical, as well as their combination, while in other species, as in the *Vinca major*, we find the symmetry only in the combination, the units or petals being unsymmetrical. Nature teaches the artist of design the lesson of adaptation. In flowers whose discs are in a horizontal plane, those in fact which we look down upon, as in the daisy, dandelion, buttercup, celandine, &c., the flower is stellate, or multi-symmetrical; but flowers placed on their stalks in vertical or inclined planes, as in the pansy, are generally bi-symmetrical, or of two equal formed parts. The potato-flower (*Solanum tuberosum*) is a multi-symmetrical figure in plan, but bi-symmetrical in side view. Among symmetrical flowers, we may mention a few common species—the lily of the valley (*Convallaria majalis*); the potato blossom, the daisy, buttercup, the *Geum urbanum*, the silverweed (*Potentilla anserina*); the elder (*Sambucus nigra*); the daffodil (*Narcissus pseudo-narcissus*); the corncockle, the St. John's wort (*Hypericum*); the periwinkle (*Vinca major*); all more or less symmetrical in form, and full of suggestion to the designer. Many of these, as the lily of the valley, the potato, the daffodil, &c., have been scantily employed by the decorative artist; their very commonness, their lowliness, and utility, have tended rather to make them the despised of Flora's daughters. Yet the potato-blossom is one of the most beautiful; its leaves, growth, and fruit, are all worthy the attention of the art botanist; and one year it became the plant which the Department of Science and Art adopted as a basis of prize design. It may be remarked that the floral parts of a plant are not always of uniform number; in some instances irregularities occur in the number and form of the sepals and petals; thus, in the lesser celandine, Mr. Hulme tells us, “out of one hundred flowers, ninety-seven had three sepals, two had ten petals, nine had seven petals,

eighteen had nine petals, sixty-eight had eight petals; while one had five sepals and fourteen petals, one had four sepals and seven petals, and one four sepals and nine petals.” This anomaly has a certain value to the artist, for it teaches him he may vary these parts of the calyx and corolla without violating even natural laws of growth. It is to be generally observed, however, that a numerical relation between the parts of a flower exists; thus some parts are in threes, other multiples of three. In the Iris family the perianth is of six parts, three stamens, either three or one stigma, and a three-celled ovary. The holly (*Ilex aquifolium*) has its sepals, petals, stamens, and stigmas, in fours. Five and its multiples is a common relation; thus, in the corncockle, we have a five-toothed calyx, a five-petalled corolla, with ten stamens. Exceptions to this law are rare.

Among the distinctions of inflorescence that deserve the notice of the designer, are the position and form of the calyx-leaves or segments, their relation with regard to the corolla-leaves or petals; the form of the corolla, whether bilabiate or lipped, campanulate or bell-shaped. Again, the union of sepals or petals, known by botanists as *cohesion*, is a point to notice; also the *adhesion*, a botanical term signifying the union of *unlike* parts of the flower, as that of corolla to stamens, &c. Sometimes also, the stamens constitute the flower, sometimes the corolla, the other parts being “suppressed.” In the buttercup we find neither of these distinctions. Some of the commonest and most despised flowers, we would observe here, afford better means of distinguishing the principal parts of inflorescence or flower growth than the rarer kinds; and no designer or art student need be deterred from a study of botany, in which the elements of flowers and leaves, their connection and combination and other ornamental properties may at least be acquired. We could have wished Mr. Hulme to have given us a collected view of those points and properties which especially belong to the artistic branch of botany. After all, these points are few, and the scientific terms once understood convey in the concise manner the form of a flower. For example, if our readers should ask us to describe a wall-flower ornamentally, we could not better do so than as follows:—Calyx polysepalous (free sepals); corolla, polypetalous (free petals); regular; stamens, tetradynamous (six stamens, four long and two short); we might have said the sepals were free, and four in number; the petals free and four in number, &c.; but the compound terms are easily remembered when once actually brought home to the mind. The flower of the bramble or blackberry is a common flower, but singularly suggestive. The calyx is composed of coherent sepals (*gamosepalous*); the corolla is regular and polypetalous; and the stamens are numerous and free, or polyandrous. All these are ornamental points. Take the common primrose (*Primula vulgaris*); we find the corolla leaves gamopetalous. Comparing the cowslip and others of the same Natural Order, we observe a similarity in the inflorescence. In the daisy and thistle the florets of the ray and the bristly calyx are equally characteristic features demanding the student's attention. The shape of the receptacle is another feature to notice, and the florets composing the discs or the centre corollas. There are some floral forms which present a marked variation from the normal kind of flower, and are of ornamental value, the Chinese-lantern plant (*Dielytra*), for instance, and the fuchsia.

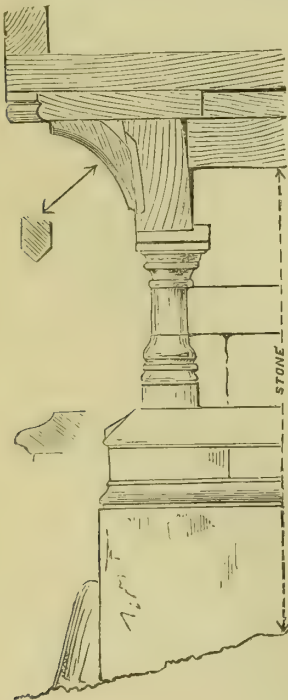
Let us now pass in review some of the beautiful forms of inflorescence Mr. Hulme illustrates in which these different characteristics are observed, and alluding only to those of a special ornamental value to the artist. One of the most beautiful forms is that of the corncockle already mentioned; the calyx leaves of elongated pointed form and five in number, alternate and extend beyond the five petals



which interlap at their edges; this flower is admirably adapted for geometrical ornamentation on flat surfaces. The daffodil may be employed equally as a stellate ornament, or as a bi-symmetrical upright form when observed laterally; the same may be said of the dielytra or lantern-plant, and the fuchsia, the garden crocus, thistle, &c., &c. The Sweet William is a flower of five petals, its outline is a pentagon and the petals interlap each other; it is eminently suited for flat decoration. Equally instructive are some stem forms which Mr. Hulme gives. These are suggestive to the architect as well as to the decorative artist. Although the circle is the common type of section, we find a variety of geometrical forms. The triangular section, the most rigid form laterally and one presenting the least obstruction, is typical to the stems of all water plants; the angle it presents to the flowing stream diverts the current like the pier of a bridge. In the sedges we have a hollow-sided triangular stem; again in the water plantain (*Alisma plantago*) the sides are convex; growing on the banks rather than in the stream. In these two distinct forms we have a wonderful instance of Nature's law of adaptation. The stem of the papyrus is similar to the last. Other families of plants have stems of square cross section or based on it, as in the white dead-nettle where the circular form has four circular shafts not unlike a very common section of pillar in early styles of Gothic. The Labiate family have many square forms of stem-section. Complex polygonal forms occur, as in the pentagonal and hexagonal stems of the meadow-sweet and the hop. The Umbelliferae order display a rich variety of furrowed and fluted stems, when cut through, as for example, the wild carrot, fool's parsley, &c.; others display irregular and deeply-channelled stem sections. Mr. Hulme presents a series of some of the shaft sections of Gothic churches to show their analogy to many stems of plants. Altogether, we may say many useful hints on structural science may be gathered from a deeper study of the structure of plant form than our architects are accustomed to devote.

#### SOME NOTES OF A MONTH IN NORMANDY.—No. IV.

AT Bayeux we must still linger for a little while, in order to see the timber houses in the street leading from the west end of the



Cathedral to the Rue St. Malo. I give here a diagonal sketch elevation, to scale, of the

angle house, the effect of which is exceedingly bold. In another house close by, the two light wooden windows, with their mullions and double transoms, still have attached to them the original shutters, of one of which a



rough sketch is here given. The width of the shutter in the clear is about 15in. Last of all, the student should not miss seeing an octagonal chamber in the building to the north of the Cathedral. The cardinal sides of this little room measure 12ft., whilst 8ft. are given to the diagonals. From each angle spring two wooden ribs (semicircular) at right angles with the two sides of the angle; these give apparent support to a flat wooden ceiling, and spring from brackets, serving also as canopies to statues that stand on corbels 6ft. from the floor. By this arrangement there are no less than thirty-two vertical spandrels besides the eight wall spaces, and as a figure subject is painted in each space, one can easily imagine what a rich effect this Late Renaissance ceiling presents. The date of this work is 1575. From Bayeux, as a centre, the student can work a highly-interesting district. The Priory of St. Gabriel, a small, but fine twelfth-century ruin, will be one of his first attractions (see BUILDING NEWS, August 14th, 1874, for the chimney of one of the domestic buildings), and he would do well to pause and plot with care the vaulting and the sections immediately above and below capital, for, although simple enough in motive, the effect is somewhat elaborate, and altogether excellent. At Creully is a chateau more or less modernised, but still preserving a lofty tower with good machicolations well-managed at the angles, which is not always the case. But by far the most interesting church in the immediate neighbourhood of Bayeux is that at Villiers le Sec. The tower stands between nave and chancel, and the nave has aisles, but there are no transepts. The tower is about 14ft. square inside, and the walls are about 3ft. 6in. thick in the lowest stage. Besides this lowest stage, there is a lantern stage, then a ringers' floor, then a glorious belfry stage, and above all, a gabled, or as it is sometimes called, a saddle-backed roof, running east and west. The staircase turret rises to the eaves, and it also finishes with a gabled roof, but running in an opposite direction. I saw a large number of steeples in this part of Normandy, but not one, to my mind, possessed anything like the quality of this at Villiers le Sec. It is almost impossible, without drawings, to explain fully wherein this quality lies. It is, however, completely and altogether refined in its expression without being in the slightest degree weak; that is to say, there is nothing liny or thin. No feature is exaggerated, as is the case in so many of the First Pointed churches in this part of France, notably at Coutances. Then, through this refinement, which is its first or crowning characteristic, there is felt, rather than seen,

an ordered and thoroughly sober strength—the vigour of health giving power to the beauty of form. This last is more or less due, among other things, to the proportions of the doubled windows in the belfry stage, the tall gable, the angle of its apex, and the narrow courses of the masonry. I put this last in italics because I believe there are very few people who estimate at its value the importance of the jointing of masonry in both old and modern architecture. The expression of strength is due to the plain surfaces of masonry in the gables over the windows and in the turret, as well as to the numerous recesses (or orders) in the belfry windows, of which there are no less than four besides the hood moulding and the chamfered jamb within the innermost order. All these windows show fragments of tracery and transoms—two-light with a circle in the head, and all uncusped—but whether original or inserted at a later period, I had not time to determine. There are many churches in this neighbourhood more interesting archaeologically, but I venture to say there is nothing more inviting to the architect than this tower of Villiers le Sec.

St. Lô was our next halting-place, and although still picturesque, its architecture, I am sorry to say, is at a very low ebb. The objects of interest can easily be counted on your fingers. Mr. Nesfield has given us one of them—the only timber construction of any importance left in the town, and, in a former number (May 29) of the BUILDING NEWS, I have illustrated a stoneshop-front and a staircase. The churches are very uninteresting from an architectural point of view, and tame even as archaeological studies. It is true we see the somewhat rare instance of an external pulpit (illustrated by M. Viollet-le-Duc) and we have our English pride flattered and gratified as we gaze on the thick walls and machicolated round tower of fortifications made under the direction of one of our own kings. So that, speaking from my own experience, I would advise the student to make his halt at Coutances, to give St. Lô a day, stay the night at the White Horse—a charming and wonderfully cheap hotel, where every one is on the alert to please the guest, and where a really good meal can be got at a really rational price. Go on next morning early to St. Gilles, on the main road to Coutances, and get on to Coutances after mastering the very simple yet novel beauties of an interesting village church. Some of these beauties I have given in the number of the BUILDING NEWS for July 3.

At Coutances we “stand all agaze,” like the shepherds of our madrigals were said to do when they met Diana; for the Cathedral is, in one word, a wonder. It holds the same place with me, relatively to other cathedrals, that a comet does among the stars. I need scarcely say that this effect is solely attributable to the steeples, for the main structure is both in general design and detail almost commonplace. But in the steeples, the western ones especially, there is nothing at all commonplace. Indeed, they look rather as if they had dropped from above, stalactite-like, than as built from below. The three ideas of pinnacle, shaft, and crocket are here carried, one would hope, to their extremest limit, and yet so masterly are these extravagances treated, that it requires perhaps a course of such structures as St. Pierre Lisieux to fully appreciate the enormity of this at Coutances. Mr. Nesfield gives an admirable drawing of it, as seen from the Bishop's garden, but the western view of the towers is by far the best. There are plenty of photographs to be obtained of these, and so I passed my time in searching out some of the delicate grisaille glass in the Geometrical windows of the chapels opening from the south aisle, and in selecting two specimens of lead-work from the north windows. Some of these will be given in a future number of this journal.



Unfortunately, the horses at St. Lô are not inclined, by any course of treatment, to proceed at a greater rate than  $3\frac{1}{2}$  miles an hour, so that as I had to return the same day, I had very little time to search the by-ways of the city. One church I entered possessed, among other features of interest, a perfect series of carved stalls of late date, the backs being designed in riband work of ever-varying pattern. Here and there I noticed a good detail, sometimes of iron, sometimes of wood, others of stone; but the town is not rich in architecture, and the enormous new college now in progress does not certainly add to its attractions. From St. Lô it is a pleasant row up the river to the quaint thirteenth-century village church of Mancelier. The tower is at the west-end, battered from ground to summit; it has a gabled roof looking east and west, and is very plain but very well proportioned. In the chancel is a barrel roof with king-post and tie-beam. The small ribs are very flat, and only one and a half inch broad, and about 3ft. apart; but the main constructive timbers are large and elaborately-moulded. There are few windows, and those are wide and trefoiled, except in the belfry, where they are plain. Here also are preserved the churchyard cross and boundary wall. As yet the hand of the restorer, hardly that of the repairer, has not touched this river-side church, and this is no small merit in a land where almost every old building bristles with scaffolding, and echoes the monotonous scrape of the masons' defacing tools. From St. Lô we started back again for home, but not without two rests—one at the little town of *Beaumont le Roger*, and last at *Dieppe*. At *Beaumont le Roger* are some wonderful ruins of a once most extensive thirteenth-century abbey, two churches of some interest though late in date, some bits of domestic woodwork, and a jolly little hotel (*Anglicie, Inn*), where we were treated most admirably by M. Burette. Everything was primitive, and simple, and honest, and even the Normandy cider was rashly put on the table with its primitive potency unwatered.

*DIEPPE* itself has very little to interest the architect beyond the walls of St. Jacques; but in its neighbourhood we have the *Manoir d'Ango*, illustrated in the *BUILDING NEWS* for February 27 and April 3; *Offranville*, with its Columbarium, an illustration of which will be given shortly; *Ancourt Church*, with its "wall-veil" decoration of flint and granite; and *Belle Ville Church*, just beyond the Marquis of Salisbury's seaside home. This little church of *Belle Ville* has a chancel arch of more than usual beauty. It is the only old part (thirteenth century) remaining inside, and as some one may ere long be ill-natured enough to restore even this out-of-the-way place, I have taken some pains to secure accurate drawings and measurements of it. (See *BUILDING NEWS* of October 24.)

We have here almost the very minimum of carving, the least possible moulding for an arch of two orders, and yet nothing seems wanting. This is verily the economy of the true artist, and is worthy of all praise. *Berneval*, *Tourville la Chapelle*, and *Clicourt*, lie in the same direction as *Ancourt* and *Belle Ville*, but it is not worth any one's time to take any trouble about them.

*Argues*, near *Dieppe*, is chiefly visited for a very bad ruin of a castle; inside the church the architect will find in the late stone screen and some well carved figures of earlier date the real interest of the place. But my month is over, and it is quite time I said farewell to Normandy; one word however, in conclusion. It was not alone at the places where I stayed that I reaped. All along the road—for the country was new to me—I sought where I could put in my sickle. The pretty spirelet just past *Affray*; the little church at *Bonneville*; the steeples between *Caen* and *Bayeux*; the quaint large wooden pyramidal spire near *Bernay*; the bell-turreted church of *Boissy*; the charming

wooden spire of *Serquiny*; the strange steeple between *Longueville* and *Dieppe*; the effective large spire-roofed tower near *Mezidon*; the tall spire in the wood between *Serquiny* and *Elbeuf*, are all full of suggestion, and, thanks to my opera-glass and the slow travelling—are down in my sketch-book. Moral.—Don't bury yourself in your newspaper or novel when you visit new countries.

E. W. GODWIN.

#### LECTURES ON ART AND ARCHITECTURE.—IV.\*

BY ALEXANDER THOMSON, I.A., ARCHITECT, GLASGOW.

(Concluded from p. 516.)

IN the case of the arch, there is not only no rest for the eye, but its radiating form has the effect of sending the attention off in every direction in search of other objects, instead of supplying in itself a field of pleasurable repose. Hence the tendency in Gothic windows to fill up the central spaces by dividing and multiplying into more and more intricate traceries until it can be carried out no farther, and so the whole process has to be revolutionised to begin again at the beginning. Instead of leading by concentration to repose and ideal excellence, the tendency of the arch is in the opposite direction,—towards dissipation and dispersion, to seek for variety and change in the general field of mediocrity. In its æsthetic, as in its constructive capacity, the arch never sleeps. These remarks, you will observe, as I have already said, are applicable to a single opening or window, considered strictly and separately as an architectural form; considered in combination with others—as in rows—the eye is content with a less critical examination, and so, by means of well-marked horizontal lines, such as cill-courses and cornices, a row of windows may be reduced to a very tolerable degree of disciplined subordination. And the lintelled window, from being most self-contained, and at the same time more in sympathy with the prevailing horizontality of buildings in general, is by far the most tractable of the two kinds.

But in every case in which the piers can with propriety be made the chief features of an architectural composition they will be found to have a degree of dignity that no merely fenestrated design can ever pretend to. It might have been from this kind of feeling that the Romans continued to use the orders as mere mural decorations long after they had ceased to be applicable in their original and properly structural form. As a striking example of this, I would call your attention to the Colosseum, and, as this building is remarkable for various reasons, it may be well that we take a general view of it and of the principles upon which it is constructed. Noticing in course the external architecture, it is the hugest building of its kind; indeed, it is one of the largest single buildings which remain to us of the days of antiquity, and has been an object of wonderment to all beholders ever since it was built. The purpose of this great structure illustrates a prominent point in the characters and manners of the Romans. Internally it is an immense oval-shaped basin, with a large flat bottom forming the arena, and the sloping sides, ringed with seats, tier above tier, providing accommodation for fifty or sixty thousand spectators. There is something terrible in the thought of such a vast multitude of cruel-hearted people gathered together, and, as if by community of intense thirst for blood, united into a mighty monster, shouting to the strong, hooting at the weak, and gloating with lustful eye upon the agonies of men and beasts struggling in mortal combat in the open space below. The enormous cost of such an erection as this exhibits another peculiarity of Roman character—the anxiety of the great to propitiate the favour of the multitude. Not only was this displayed in the cost of the building, but the nobles vied with each other in the extravagance of expenditure lavished upon providing combatants and other necessary means for furnishing these horrid spectacles. The ferocity of their fabled wolf foster-mother was thus kept alive in these savage pastimes, and in the exterminating wars in which this people were almost constantly engaged. As seen from the outside, this building is tremendously ugly. It is bad in form, and

treated with a degree of rudeness that corresponds well with the unhallowed purpose for which it was built. Yet it has been copied, and will likely be copied again. A short inquiry into the qualities of the oval, and its suitability as an architectural form, may be the means of leading to such a train of thought as may unsettle prejudice and perhaps confirm opinion. We derive a thoroughly satisfactory kind of pleasure from looking at a sphere, it is so faultless, so entirely complete; the gradations of light and shade which it exhibits, blended with the delicate effects of reflection, all so softly beautiful, present to our mind a perfect figure of stillness, of the unchanged and unchangeable. Now look at the oval, and consider the great variety of which this beautiful form is capable. Variety to the ordinary observer means such a palpable difference as that between big and little, long and short, thick and thin, round and square, reversed curves, opposing angles, and the like; and this is the kind of variety which the vulgar uneducated mind can alone comprehend, which it peremptorily demands, and which the coarser styles of architecture can alone supply. But, when it is considered that all that is excellent lies beyond the sphere of the ordinary observer, the popular critic, and the mere business-architect, it may be for edification to direct attention to the more subtle kind of variety which constitutes refinement and excellence, and it is to be found in the merely modified differences of what is nominally the same form. In the first kind of variety the material qualities predominate; in the last æsthetic is the more remarkable. For instance, the features of the human face, and their arrangement, are the same in kind all over the world; and yet the variety of æsthetic form and expression to be found in that comparatively limited material, variety, is beyond measure incomprehensible. But if we limit our observation to the possible modifications of a single material form, we will be the more able to give undivided attention to the subject, and thereby derive more solid and permanent advantage. I spoke of the sphere as faultless. I would speak of the oval as admirable. Its typical object is the bird's egg. If any of you will take the trouble to look over and carefully examine a collection of birds' eggs, you will find your powers of discrimination, your capacity for delicate impression and nice distinction, tested to their very utmost. You will remark the expression of concentrated energy which seems contained in the compact and almost globular form of the eggs of the hawk, as compared with the more elongated and less decided form of those of the majority of what are termed sea-fowl. Some eggs are apparently the same at both ends, others show a slight preponderance of weight towards one end; whilst in the case of the sea-fowl, and others which the Creator has not gifted with the building art, but has appointed them the bare rock or bare ground as a place of incubation, the eggs are shaped like a peg-top, so light at the one end and so heavy at the other, that they have no tendency to roll off their smooth bed, even though it may have a very considerable slope. Between these more noticeable forms there is a great variety of the most exquisite modifications, presenting to the earnest student such a field of observation and instruction as cannot be passed over without his being richly rewarded—his judgment raised to a degree of refinement from which it will be impossible ever to recede. The form of the egg being beautiful in itself, and having many pleasing associations, it is not wonderful that man should unconsciously seek to produce it in his work. The Greeks recognised the beauty of the line, and adapted its finest qualities in their mouldings, which are nearly all composed of sections of this form; the Romans, on the other hand, adopted it for the ground-plan of their amphitheatres, whilst the curves of their mouldings generally are composed of sections of the circle.

To return to the consideration of the Colosseum, and the suitability of the oval for the ground-plan of such a structure. I would call your attention to the fact that a circle looked at obliquely assumes the oval form, varying in proportion and interest with every change of angle at which we view it, but always perfect, always beautiful. But the case is quite different with the oval as a distinct shape. [I may mention that I am speaking now of the circle and the oval as geometrical figures, not of the solid forms of the sphere and the egg.] When an oval figure is set directly in front of the eye, either standing on end or lying on its side, it is a very agreeable

\* Delivered at the Glasgow School of Art and Haldane Academy.



form, and, as I have already shown, is capable of the most exquisite treatment; but when used as we frequently see it in garden-plots, and in the ceilings of rooms, it may happen to be one of the most ungainly forms that can be conceived, inasmuch as if looked at from any other position than on the line of either of its centres, it seems distorted in a most disagreeable way. Thus, this very admirable shape, by being unskillfully applied, may, instead of affording us pleasure, produce the very opposite effect, that of extreme abhorrence; whereas, if the circle is used for these purposes, it presents a series of beautiful ovals according to the various points from which it is viewed. It may be that those who planned the Colosseum and other structures of the kind had some utilitarian purpose in view in adopting this shape; but certainly, if their motive was really æsthetic, they committed a gross mistake. Nevertheless, the form of this building has been greatly admired; and we can only account for this from the fact that through prejudice we sometimes fail to distinguish between things that are awfully sublime and things that are awfully hideous.

Let me now draw your attention to the architecture of the exterior, as illustrating a mode of treatment which was extensively adopted by the Romans. It will be remembered that, while treating of Egyptian architecture, we observed that it was composed of certain modifications and combinations of a simple form, almost a mere outline distinguished by sloping sides and horizontal cornice inclosing a solid wall having no architectural features except on the entrance-front; that while this retained the initial form, it was penetrated in the smaller examples by a simple doorway, in the larger by the greater part of what may be termed the bosom of the wall being cut out and its place supplied by columns. When we came to the Greek, we found that the columnar effect which was merely exceptional in the Egyptian had become the chief characteristic, and had been developed into a complete peristyle; that the Greek temple aimed at ideal perfection not only in the general proportion of the building, but in all its parts, each part bearing some proportional relation to the adjoining parts and to the whole, that the height was divided into three well-defined members—the stylobate, colonnade, and entablature. In the Colosseum we see something totally different. There is no recognisable proportion in the length, breadth, and height to each other; there is no subdivision corresponding to stylobate, colonnade, and entablature; it has no base to give it stability, no coronal to give it dignity, no point or feature more prominent than another for the eye to rest upon. It is a mere mass divided into four stories of equal height, the three lower ones pierced with arched openings all of the same form and character, the uppermost story blank. It belongs to that class of designs which in paperhangings and printed calicoes is called "all-over patterns." In saying that it illustrates a mode of treatment which was extensively practised by the Romans, I mean that it is a combination of the old and new styles of architecture, the window boldly asserting its claim to consideration as representing the chief principles of the structure, while the column and entablature, which has hitherto held undisputed sway, are now reduced to the position of waiting attendance upon their ruder and more popular rivals—lending their old graces to give an air of respectability to the comparatively raw and uncouth forms of the new order of things. The architects of this period, recognising in the arched void a feature which would bend with readiness to the new and varied wants of their clients, seemed disposed to use it freely, but they were as yet in some measure under the influence of their early training, for, while they pierced their walls with arched openings, they at the same time decorated them with the orders, one over the other. On the first story of the Colosseum there is a modification of the Doric; on the second, of the Ionic; and on the third, of the Corinthian, their columns projecting about three-quarters of their diameters from the wall. The fourth story, which is solid wall, is very badly managed. It is ornamented with pilasters of a sort of composite character without any proper entablature. The difficulty was felt of rendering the wall-spaces quite satisfactory. A pier of sufficient width to afford the necessary structural strength looked squat and inelegant in its proportions, and so a column was placed in front of it in order partly to divert attention from the faults of the arched opening and make up for its lack of in-

terest, but chiefly to correct the proportions of the pier by supplying the element of height, the want of which was strongly felt. Moreover, it served the further purpose of exhibiting, along with the arch and impost-pilasters, that principle of alternation which we see running through almost all kinds of architectural design—for example, in the spiral bead with its whorls in the egg-and-tongue enrichment, in the metopes and triglyphs of the Doric frieze, in the windows and buttresses of the side wall of a Gothic church—indeed, the column as used here did in some measure serve the purpose of a buttress, in addition to its decorative purpose. Then, the entablatures over these columns served two important purposes. The radiating arch has the tendency of directing or throwing off the attention at all points; the entablature has the effect of preventing this vague wandering, and by presenting a well-marked horizontal line, affords, as it were, a channel or course by which the observing faculty is carried along in one direction, so as to feel the influence of whatever provision there may be for the æsthetic faculty. The other purpose which those entablatures serve, is that of hoops, which seem to bind the structure together and check its apparent disposition to burst outwards; and this is all the more necessary from the loose and unstable appearance inseparable from the oval form of the building.

At a later period, when the artistic sense became more obtuse, the basements and entablatures were broken under and over these half-relieved columns—assuming still more the character of the Gothic buttress, and initiating that tendency to the perpendicular which ultimately became the ruling principle in Gothic architecture. These broken basements and entablatures completed the degradation of the columnar style of architecture: from thenceforth it became a mere mural decoration. The Romans, as has been observed, had a much more diversified and wider range of requirements than the Greeks. Their efforts were less concentrated and their aims less noble; and probably for that reason their buildings lack that tendency towards definiteness and correctness of form and proportion which is so characteristic of those of the Greeks. In some instances the Greek forms were adopted, but in rectangular forms generally proportion seems to have been disregarded. Some of their temples seem to have been of that hulky sort of shape which distinguishes not a few of our modern churches—nearly, but not quite square. The circular form seems to have found more favour in their eyes, and because they liked it, they succeeded in treating it with much beauty and dignity of effect. The small temple at Tivoli must be familiar to some of you, it has been such a favourite with those artists who have painted the interesting objects in and around Rome. The effect of this very graceful little edifice, built upon the edge of a rugged precipice overhanging a cascade, is extremely pleasing, and shows how a judicious application of human art may render an inconsiderable bit of natural scenery an object of attraction and delight to all who are capable of being moved by beauty. Little can be said as to its history or purpose; but, from the character of the detail, it evidently belongs to the period when Greek influences were prevalent, nevertheless it is strongly imbued with the rude vigorous spirit of Roman art. The flower upon the abacus of the capital is peculiarly Roman-like, and exhibits a freshness of growth that is quite charming. There is another example of this form in the city, commonly called the Temple of Peace, but it has suffered more from the hand of the destroyer. The upper part is entirely gone. The great mausoleum of Hadrian, now known as the Castle of Saint Angelo, must have been a very magnificent work, but it has been stripped of all its architectural and sculptural glories.

The most remarkable of those circular buildings which remain is the Pantheon, the temple of all the gods. Apart from the architectural interest attached to it, this great building is deeply significant as marking a stage in the history of the human race when old things were about to pass away. The nations of antiquity in early times had very little intercourse with each other, and, although there was a certain uniformity of religion common to each of the great races, yet the subdivisions of those races into separate nations gave rise also to considerable difference as to the deities which they worshipped, and different idols representing the same deities were supposed to have peculiarities of character and

powers proper to themselves as the gods of certain countries or presiding over certain peoples. The more extended sphere of observation which the conquest of many nations opened up to the Romans enabled them to see the absurdity of the claims which these nations set forth for their respective gods; and the haughty scorn which they cast upon the superstition of others recoiled upon their own faith, and caused it to wither at the root. Their doubts brought indifference, or, as some would say, liberality of sentiment, for, although the educated Romans had thus ceased to believe in the power of the gods, they did not feel called upon to expose the system of error which had so long occupied their thoughts and directed their actions. They became not merely tolerant of the various forms of faith still existing in the hearts of the people, but they saw that while any vitality remained in the system it might be turned to account as an agent of government, and so they, as it were, slipped a bridle into the mouth of superstition, and made it serve them. With this purpose in view the Pantheon was dedicated to the worship of all the gods. This building has been the subject of much learned conjecture. It consists externally of an immense rotunda of rough brickwork, surmounted by a flat dome, with a Corinthian portico of very great beauty and grandeur attached to it. The shafts of the columns are of granite, each in one stone, 36ft. high by 5ft. in diameter. Those of the outside row are grey, while the inner ones are red. The capitals and bases are of white marble, as is also the entablature. The tympanum bears evidence of having been filled with bronze sculptures. From the total want of sympathy, both in character and quality of design, between the rotunda and the portico, it is supposed that they belong to different periods, and that the portico, from the greatly superior character of its details, is the earliest. From the roughness of the external walls of the rotunda, it is evident that as we see it now it is incomplete; and yet, from the moulded cornices and string-courses of brick and stone with which the wall is furnished, there is little room left for any kind of architectural treatment worthy of the general importance of the structure. Possibly the rough parts of the wall may have been covered, or intended to have been covered, with stucco, as many of their later buildings were, in which bricks were used instead of stone or marble.

But it is the interior of the Pantheon that has attracted the notice and commanded the admiration of all beholders. It is considered to be one of the grandest applications of the arch which has been achieved either in ancient or modern times. It measures 145ft. 6in. in diameter, by 147ft. in height. These are noble dimensions; but in this, as in many other instances, both ancient and modern, the grandeur of the conception is greatly marred by the unskillfulness of the architectural treatment. The incongruity which we observed between the portico and the rotunda externally is quite as remarkable between the two principal divisions of the interior of the rotunda; but as it has been repeatedly overhauled, both in ancient and comparatively modern times, we can only judge of it as it appears to us now. The perpendicular portion of the wall is divided into two stories, each of which is cut up into small and varied parts, with correspondingly minute mouldings and carving after the fashion of the degraded Greek style, which still lingered about the Roman edifices. The first story is divided into eight recesses, three of which on each side have an entablature over them carried by Corinthian columns and pilasters, while the entrance-opening and the corresponding recess opposite are spanned by arches broken up through the otherwise continuous entablature and reaching even to the top of the second story. On the solid piers between these recesses there are what appear to be shrines, furnished with still smaller Corinthian columns and pilasters, and surrounded with panellings on the same minute scale. In the second story there are openings like to windows, with pediments over them, alternating with panels of a different design on the piers between, and of course detailed upon a small scale. When all this confused composition and trifling detail is contrasted with the simple grandeur of the dome we are surprised that two such inconsistent modes of design should be found together in the same building, and probably by the same architect. The dome is enriched by bold coffers of square form, which, while serving as a becoming decoration, help also to enlighten the arch without weakening



it. But one of the most remarkable features in this really fine interior is the mode of lighting. This is managed by a single round opening in the top of the dome. The effect is extremely fine, and gives an expression of composure and quiet dignity which perhaps no other building can show.

The aqueducts, the baths, the basilica, and the triumphal arches are all very characteristic Roman buildings, but our time will not admit of their being noticed in detail. Their aqueducts, stretching across valleys in long-drawn lines of arches in regular marching order bearing abundant streams of clear cold water from the grassy slopes of the mountains to the densely-crowded habitations of the cities; their great bathing-establishments, providing every luxury which experience and skill could devise, give evidence of the practical good sense, the wealth, and energy of that great people. The triumphal arches show a less commendable, but not less characteristic, phase of their character. One of them, the Arch of Titus, is especially interesting, from the sculptures upon it, which represent the triumph of the conquerors of Jerusalem carrying as trophies the sacred vessels of the Temple to gratify the vanity of the Roman mob. There is a peculiar interest attached to the basilica, as being the type or progenitor of the cathedral of the Middle Ages. The basilica was the place of public resort where people went to spend a pleasant hour in gossip over the current topics of the day; where the merchants met as on 'Change; where the judges dispensed justice, and young orators tried their powers of argument and persuasion upon the assembled loungers; and where anyone who had anything to say to the people had an opportunity of being heard. There, doubtless, the Apostles and their immediate successors, when expelled from the Jewish synagogues, first told the strange story of the life, death, and resurrection of the Saviour in the wondering ears of the Gentiles. As the affairs of the empire fell into disorder, and the interest of commerce declined, the Christian religion advanced, and became a matter of absorbing interest to those who resorted to the basilica, until in time those buildings became places of worship; and when churches came to be required, they were built after the same fashion, and continued to be called basilica. The transition from the basilica to the Gothic church was easily brought about, and thus, by an unbroken chain of successive links, the ancient and modern civilisations are bound together.

When I began these lectures my intention was to restrict them to three—the first on art in general; the second on the origin of architecture and the ancient architectural styles; and the third on the Mediaeval styles, the present practice, and what we should aim at for the future. But the lectures have extended to four, and three of them have been devoted to matters which, according to the original plan, were all to have been overtaken by the second. In the first I endeavoured to explain what art was; to point out the distinction between the objective and subjective theories of art; that these two theories were aptly represented by the words *fact* and *truth*; that according to the objective theory, art consists in the representation by painting and sculpture of what we see with our eyes, and that nature is the only legitimate source of art and test of artistic merit; that the subjective theory consists in the expression of what we feel in our hearts and conceive in our imaginations by whatever means one mind can communicate with another; that we can conceive a higher degree of excellence than is to be found within the sphere of our observation or experience; that nature is neither the source of art nor the test of excellence; and that the duty of the artist is mainly to realise that higher kind of beauty which we call the ideal. In the second lecture I showed that the laws of architecture had been instituted at the beginning in the councils of eternity, and that man, being made in the image of God, was ordained to carry out the purposes of the Creator, and that to this end he was sent into the world naked, and laid under the necessity not only of clothing himself, but of building himself a house; that in common with a great many of the lower animals he was endowed with an instinct or faculty for building; and that by this, combined with a spiritual endowment of an æsthetic faculty, and moved with the desire to honour his Creator, he has realised those laws of architecture which were divinely written upon his heart, and has produced forms and combinations which have no resemblance to anything

which exists in nature. We followed the development of these laws among the Egyptians, showing that the motive of their art was an endeavour to realise the eternal. In the third lecture we witnessed the laws of architecture carried to the very highest degrees of development to which they have hitherto attained, by the Greeks, who aimed at achieving excellence in all that they attempted. In the present lecture we have followed architecture on its decline through the Roman period, and have been brought to the very verge of the dark valley which separates the ideal and intellectual glories of the ancient world from the vigorous expression of life in the Middle Ages—and here, for the present, we must stop. It only remains for me to thank you for the attention which you have given to these very unworthy expositions of a very lofty theme, and for the kind forbearance which you have extended to my inexperience and many shortcomings; and to express our joint thanks to the trustees of the Haldane Institute for affording the means for getting up the drawings with which these lectures have been illustrated. [The illustrations were drawings—plans, elevations, sections, details, and compositions, on a very large scale, made by students of the School of Art and Haldane Academy, under the superintendence of Mr. Greenlee, the head-master, and an interior perspective of the great hall of the temple of Karnak, by Mr. Sellars, architect.]

#### BUILDERS' BENEVOLENT INSTITUTION.

THE annual dinner in connection with this Institution was held on Thursday, the 5th inst., at Willis's Rooms, St. James's, Geo. Dines, Esq., President, in the chair, supported by a very large number of the principal members of the London building trade. About 240 sat down. The usual loyal and patriotic toasts having been given, The CHAIRMAN, in proposing the toast of the evening, "The Builders' Benevolent Institution," briefly detailed the history of the charity. It was founded in 1847, and since that time 128 pensioners had been admitted upon its funds, there being 42 at the present time, the men receiving £24 and the women £20 annually. The amount paid in pensions since the commencement of the Institution was no less than £18,113. 6s. 8d. These pensions were paid from the annual subscriptions, from the interest on funded property belonging to the Institution, and from profits obtained by the annual balls, and the last item amounted to as much as £2,331. 7s. 5d. Incidentally, he would remark that the next Builders' ball had been fixed for January 21st next, and any gentleman desirous of serving as one of the stewards would oblige by communicating with the secretary. The amount of funded stock belonging to the Institution at the present time was £17,529. 14s. 2d., of which £3,541. 0s. 5d. belonged to the building fund. With all this, the Institution was not what it should be as the principal charitable institution connected with the building trade. The first-class builders and the middle-class builders had supported the Institution very liberally, but somehow or other the directors of the Institution had never yet been able to cast their nets so as to bring in the smaller fry, whose numbers would compensate for the smallness of the contributions they would be able individually to give. There were 1,500 members of the London building trade in the "Directory" who did contribute to the funds of the Institution, and it was sincerely to be hoped that some means would be devised of enlisting their sympathy in its aid, especially as the building trade, though one of great wealth and importance, was one of an extremely hazardous nature, and the vicissitudes of fortune might cause the man who was to-day in a large way of business to need to-morrow help from such an institution as that of which he was President. He appealed to the company to show a good account of themselves in the subscription lists, and concluded by proposing "Prosperity to the Builders' Benevolent Institution."

Mr. PLUCKNETT (Cubitt and Co.) next proposed the Health of the President, who, he said, was ever ready to serve the Institution to the utmost of his ability. "Mr. Dines having responded, Mr. Russell Freeman proposed "The Patrons, Vice-Presidents, and Trustees," coupled with the name of Mr. George Jennings, who acknowledged the compliment.

Mr. J. C. MACEY, in proposing "The Treasurer" (George Plucknett, Esq.) paid a warm

tribute to the great and continuous efforts which that gentleman had made on behalf of the Institution. There was no man in the building trade who had given so much time and energy to the affairs of the Institution, and although there were many honourable names associated with the building trade, no name could be mentioned which would be received with greater respect than that of Mr. George Plucknett.

Mr. PLUCKNETT, in responding, appealed for an increase in the amount of annual subscriptions, for an increase of only £100 per annum would enable the Directors to receive four or five more pensioners on the funds of the Institution.

Mr. ROGERS proposed "The Architects and Surveyors."

Mr. GEORGE GODWIN, F.S.A., in responding, said that the Builders' Benevolent Institution was not on the scale of importance and magnitude which the vastness of the trades involved required. He would supplement what had been said on this head by saying that it was a positive fact, deducible from the last census, that during the last ten years £240,000,000 sterling were spent in erecting dwelling-houses in the United Kingdom, and it was equally certain that if the population went on increasing in the same ratio as in the past, there would have to be spent for the same purpose during the next ten years the sum of £250,000,000—or no less than £25,000,000 a year. This was exclusive of the enormous sums spent in the erection of churches, railway stations, public buildings, bridges, &c., which would bring the total up to an amount which would seem fabulous. Surely, then, the Builders' Benevolent Institution ought to have an annual income of £10,000 or £15,000, rather than £2,000 or £3,000, if it were to worthily represent the interests of the building trade.

The other toasts were—"The Directors and Stewards" (proposed by Mr. Thomas Robinson and responded to by Mr. Simpson), "The Ladies" (proposed by the Chairman and responded to by Mr. Steward), and "The Secretary" Mr. A. G. Harris).

Subscriptions to the amount of £521. 15s. 6d. were announced during the evening.

#### PRIZES OFFERED BY OR THROUGH THE ARCHITECTURAL ASSOCIATION.

THE following prizes are offered by or through the Architectural Association for session 1874-75:—

*To Members of the Association.*—A prize of 2½ guineas for the best essay on either of the following subjects, viz., (1) A Monograph of Andrea Palladio. (2) The Influence of Material on Gothic Architecture. (3) "On the Comparative Advantages of Vaulting and Open Timber Roofs."

*To Members of the Class of Design.*—A prize of 3 guineas for the best series of sketches contributed in the class during the Session, and a prize of 2 guineas for the second best series.

*To Members of the Class of Elementary Design.*—A prize of 2 guineas for the best series of studies submitted during the Session, and a prize of one guinea for the second-best series.

*To Members of the Class of Construction.*—A prize of 2½ guineas for the best series of papers submitted at the meetings of the class, and a prize of 1½ guineas for the second-best series.

*To Members of the Association.*—(By the Architectural Union Co.) A prize of £5 for the best series of measured drawings from existing buildings in England, or portions of the same, erected previous to the eighteenth century. A prize of £2. 10s. will be given by the Association for the second-best series. The object of this prize is to obtain a series of drawings showing construction, the jointing and bonding of masonry, and general framing of timber. Detail drawings to be to a scale of not less than half an inch to a foot, and mouldings, &c., at least one quarter full size.

*To Members of the Association.*—One or more prizes of the value of £5. 5s. each will be offered from the Prize Fund for subjects to be announced in the course of the Session.

Further particulars may be had of the hon. secretaries, at 9, Conduit-street, W.

The Free Library Committee of the Derby Town Council have been empowered, subject to the sanction of the Treasury, to procure plans and estimates for the erection of new buildings for the Museum and Free Library, the cost of which will be borne by Mr. Bass, M.P.



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WEST LITTLETON—ALL SAINTS CHURCH,  
NORTHLEAF—GRAND STAIRCASE, ROCHDALE  
TOWN-HALL—TAUNTON COLLEGE SCHOOL—  
SCHOOL CHAPEL FOR SIR LIONEL PILKINGTON

## OUR LITHOGRAPHIC ILLUSTRATIONS.

## TAUNTON COLLEGE SCHOOL.

THE new buildings for the above school (originally founded 1522 and incorporated with a proprietary school 1867) were built from designs prepared in the office of Messrs. Giles and Robinson, architects (now Giles and Gane), of No. 7, Furnival's Inn, E.C. The buildings are of Monckton stone, lined internally with brick, the dressings being of Corsham Down and Ground Box Bath stone, and are covered with slates in two tints, green and purple; the corridors and staircases are of stone. The whole of the plan is not yet completed; only the front, comprising common and master's rooms, studies and vestibules with dormitories over, schoolroom, dining-hall, offices in connection therewith, &c., have been executed, leaving the head-master's house, the right wing, chapel, and museum and science classrooms to be completed at a future date. Mr. John Spiller, of Taunton, was the builder. When the design is completed the College will consist of a very complete suite of buildings, and it is intended hereafter to form in connection with it a middle-class county school, under the superintendence of the same head-master, on the same site, but otherwise distinct from it.

## HOUSE AT SHERE, SURREY.

This house, which we illustrated last week, and which is in course of erection, for A. Clay, Esq., is situated on the north side of the Dorking valley, about  $1\frac{1}{2}$  miles from the village of Shere. The view from the site, as well as all the surrounding scenery, is most beautiful. The materials used in the construction of the house are stone from the quarries in Hurtwood, some four miles off, with Fareham brick dressings. The stone is built in random horizontal courses, with a roughly-axed face. The upper portion is of pitch pine, with three thicknesses of plaster between the quarters. The stone being of a porous quality, and the situation somewhat exposed, the wall is formed of two thicknesses; the inner one being of brick. Wherever bond occurs between the outer and inner walls, the bricks used are dipped in tar so as to prevent any communication of damp from the outer to the inner wall. The interior is finished with pitch-pine, varnished. There is nothing particularly noticeable in the interior. The contractors are Messrs. Downs and Co., Union-street, Southwark, Mr. F. P. Cockerell being architect.

## THE CHURCH OF WEST LITTLETON

Is mainly interesting for its bell-turret. On the borders of Wilts and Gloucestershire we find a district remarkable for these bell-turreted churches. At Leigh-de-la-Mere, Acton Turville, Bidestone, and Corston, we meet with turrets based on the same principles of construction. There used to be two at Bidestone, but the latter one has, we believe, been destroyed, though carefully illustrated by plans, elevations, sections, and details, in "Pugin's Examples." This, and that at Corston, near Malmsbury, are the only examples that we have met with later than the thirteenth century. The illustrations we give require no comment. We may, at a future date, give an article on this interesting class of village churches.

## ALL SAINTS' CHURCH, GRAVESEND.

THE Church of All Saints, Perry-street, Gravesend, of which we give an illustration this week, was built a short time back by Mr. Thomas Blake, builder, of Gravesend, under the superintendence of the architect, Mr. James Brooks, 11, Serle-street, Lincoln's Inn. Most of us by

this time are acquainted with the architect's works, so need not trouble our readers by a lengthy description. The church is built of Kentish rag, both in and out, and with Bath stone dressings. Over the chancel arch is a bell-turret, with two bells, which forms a very good feature in the church. The pulpit, which is of different marbles, is the gift of Captain Brenchley. The whole of the carving is done, which gives it a more finished style than most of the architect's churches, as they are for the most part built in very poor neighbourhoods, and it is a very difficult thing to raise the money even to build the structure, much less do any of the ornamental work. The clerk of the works was Mr. F. Goldring, and the cost was about £4,000.

## GRAND STAIRCASE, ROCHDALE TOWN-HALL.

The grand staircase of this building, which we illustrate, is placed at the back of the large hall, and is approached through an entrance hall of 3 bays in width and 9 in length, having a groined ceiling supported on granite shafts. The staircase is 38ft. 6in. by 34ft. 6ft., divided into 9 bays of 12ft. by 11ft. 3in. The height from ground to ceiling is 49ft. 6in. The staircase is lighted by 9 three-light windows, filled with armorial glass by Heaton, Butler, and Bayne. The marbles used are from the Irish quarries. The ceiling is of yellow and red Mansfield stone. The carving was done by Mr. Earp, of London. The large hall is 90ft. by 56ft. by 54ft. Mr. W. H. Crossland is the architect.

## SCHOOL CHAPEL FOR SIR LIONEL PILKINGTON, BART.

This building, of which we give an illustration, serving as a schoolroom during the week, is so arranged with a chancel shut off from the main portion by a wooden screen and curtain, that it may be used for divine service, the classroom supplying the place of a vestry. The materials are brick, with wood window-frames, &c., and green Whitland Abbey slates to roof. The work is to be executed by local workmen, from plans furnished by W. C. Brangwyn, architect of 6, John-street, Adelphi, W.C.

## COTEHELE HOUSE, CORNWALL.

The drawing sent represents the court of above, viewed from the gateway, as mentioned by "H. A. G." in the BUILDING NEWS, July 24, 1874. Cotehele House was erected in the reign of Henry VII., and is rich in ancient implements of war, armour, painted glass, furniture, tapestry, &c. A HARRY JAMES.

## DESTRUCTION OF AMERICAN FORESTS.

CONSTANT and reckless destruction of their forests is fast bringing the people of the United States to a condition in which there will be occasion for real alarm. "It is not," says the *New York Times*, "probable that any 'scare' like that which a few years ago went over England, concerning the prospective exhaustion of her coal supply, will immediately occur in America, touching the loss of our forests; but we wish something near enough approaching it might happen, to stop a work that is full of evil promise. In the whole of the United States there is left but one really great tract of timber. It lies at the far extreme of our country, and consists of about one-half of Washington territory and a third of Oregon. California has, perhaps, 500,000 acres of forest now, of which fully one-half has been cut away within the last two or three years. Here in New York we have no considerable forest except in the Adirondack region. Our wealth of maple, walnut, and hickory is substantially gone, and a large part of it has been wantonly destroyed. Wisconsin had a magnificent forest growth, but the people are sweeping it away at a marvellously rapid rate. One billion feet of

timber was cut in a single year. It will not take more than a decade or two at the utmost to fairly exhaust this source of wealth to the State. Michigan and Minnesota are following in the same course, slashing away at their forests as if a tree had no right to lift its head. One of our most intelligent army officers, General Brisbin, who knows the western country thoroughly, and to whose accurate knowledge of this subject we are indebted for many facts, says that 50,000 acres of Wisconsin timber are cut annually to supply the Kansas and Nebraska markets alone. The Saginaw forests are even now practically destroyed, and if the Northern Pacific Railway is built, it will open up to the axe the one remaining belt of American timber in Oregon and Washington territory. The railroads have been the great destroyers of our forests. They use 160,000,000 of ties annually—that means the levelling of at least 150,000 acres of trees. The timber they use, also, is not the refuse or the inferior, but among the very best, fine young trees, 8in. to 10in. in diameter. If it is remembered that ties have to be renewed every seven years, the extent of demand on our forests will be appreciated. When 10,000 miles more of rails have been laid, it will require all the young trees in the country to supply the demand for ties. Fences are also enormous consumers of trees. In the East we are learning in this regard economy from necessity, but in the West, in some States, the farmers cut down the forests with scarcely more thought than they harvest their grain. The fences of the United States, people may not generally know, have cost more than the lands, and are to-day the most valuable class of property, save railroads and real estate in cities. Illinois alone has 2,000,000dol. invested in fences, and they cost annually 175,000dol. for repairs. In Nebraska, where excellent herd laws are in force, the necessity for fences has been so much lessened that the fences of the State cost less in proportion to population than in any other in the Union. The outrageous waste of timber caused by the felling of forests and burning of the trees to bring the land under cultivation goes on still at a fearful rate. From 1860 to 1870 no less than 12,000,000 acres of forest were thus wantonly destroyed. For fuel also vast tracts are levelled of their trees. It took 10,000 acres of forests to supply Chicago with fuel in one year—1871. Our annual decrease of forest from all these causes is not far from 8,000,000 acres. Yet we plant only 10,000 acres of new forest a year."

## CHIPS.

Messrs. H. Everitt and Son, builders, of Colchester, have just completed a new mansion in the Beverley-road, Colchester, from designs by Mr. G. Gard Pye, architect. The style is Italian. The "roof-raising" was celebrated on Monday week by a supper to the workmen, at which 90 persons were present.

The Skinners' Company have presented twenty guineas to the Council of the Royal Architectural Museum, Tufton-street, Westminster, in aid of their Drawing and Modelling Classes for Art Workmen.

The Prefect of the Seine has called upon the Municipal Council of Paris, whose term of office is just expiring, to vote a loan of £10,400,000 for the purpose of liquidating the city's floating debt, restoring a score of churches, commencing the works for the new cemetery at Mery-sur-Oise, and building various additional abattoirs and markets.

It was stated at a recent meeting of the Bolton Town Council that the new Town-hall has cost £166,418.

The India Museum is closed, in consequence of the arrangements necessary for the transfer of the collection to South Kensington.

The first meeting of the Archaeological Institute for the new season was held on Friday afternoon. Some congratulatory speeches were made as to the success of the Lippon meeting, and a paper on some recent discoveries at Carnarvon Castle by Sir L. Turner was read by the secretary. There were some other contributions, and a number of interesting objects were exhibited, including a little bronze figure of Our Lady, which was found near Ely, and seems to have formed part of a crucifix.

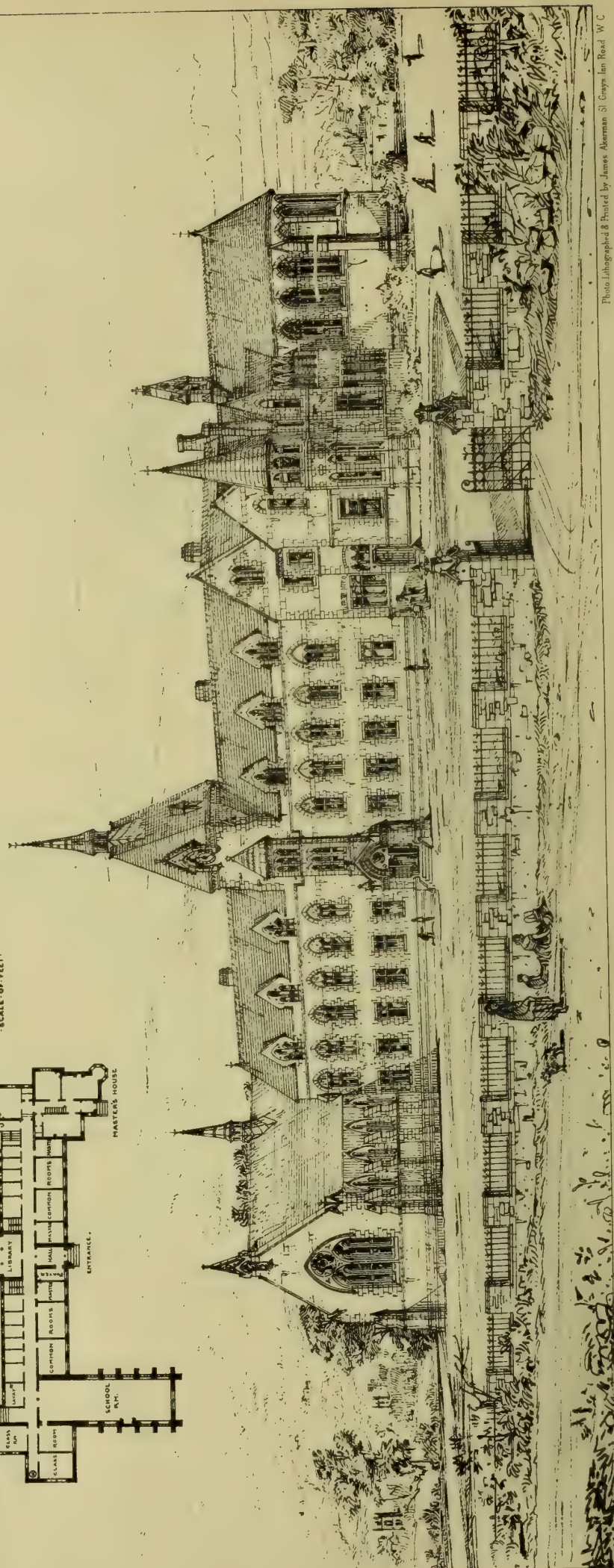
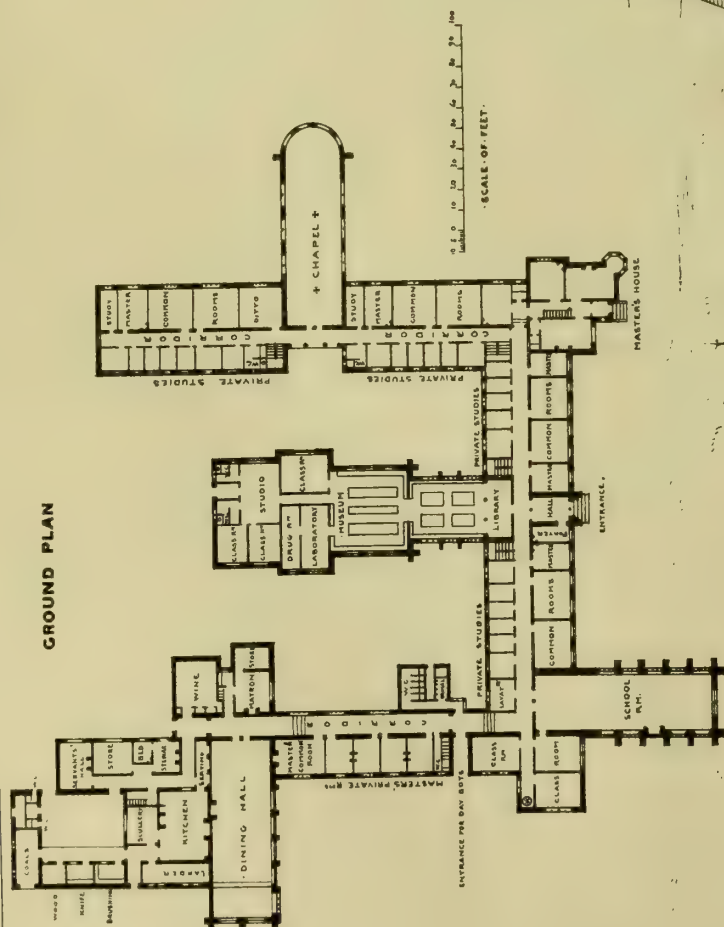






TAUNTON COLLEGE SCHOOL  
CILES & CANE, ARCHITECTS

GROUND PLAN

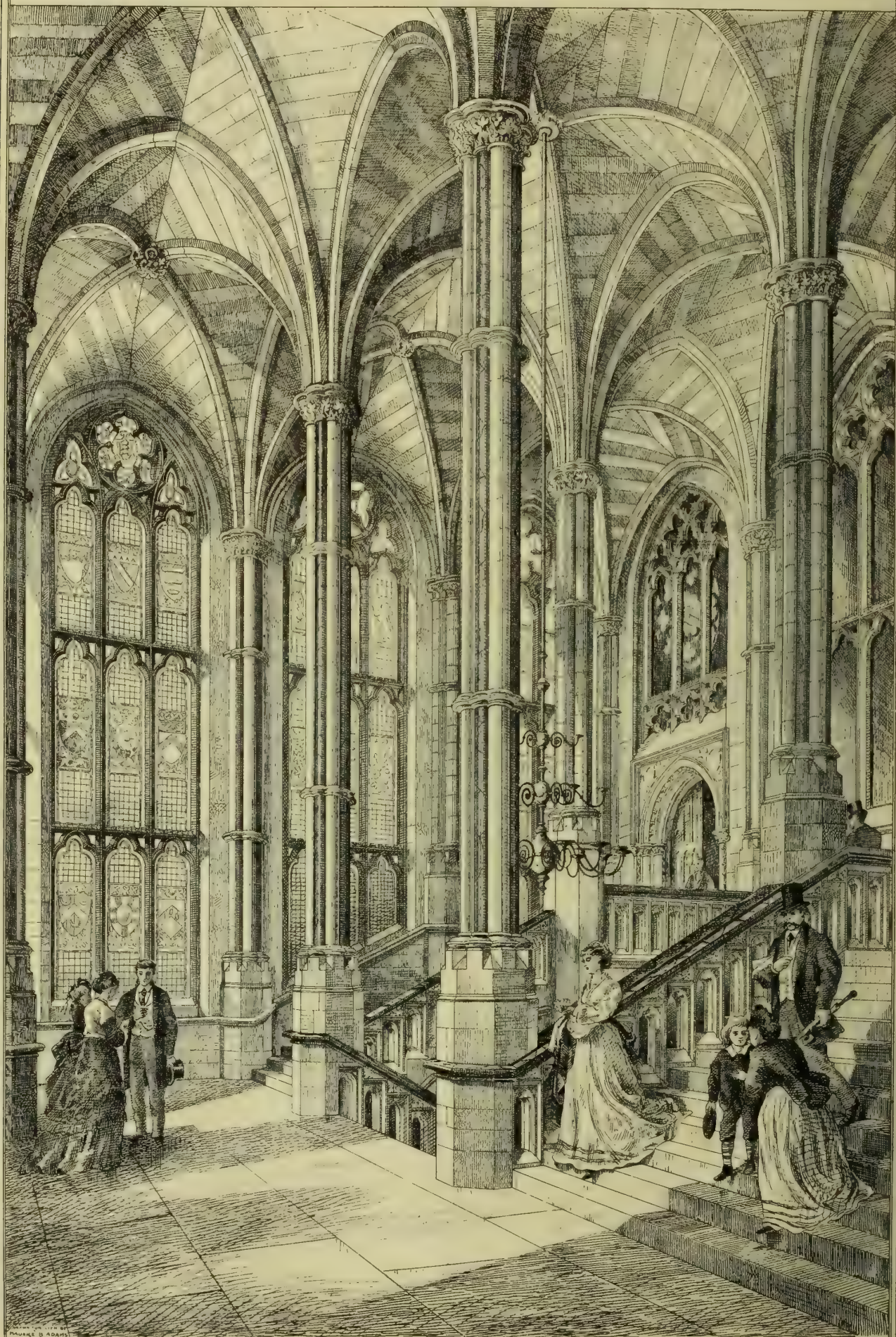








ROCHDALE : TOWN : HALL : LANCASHIRE :

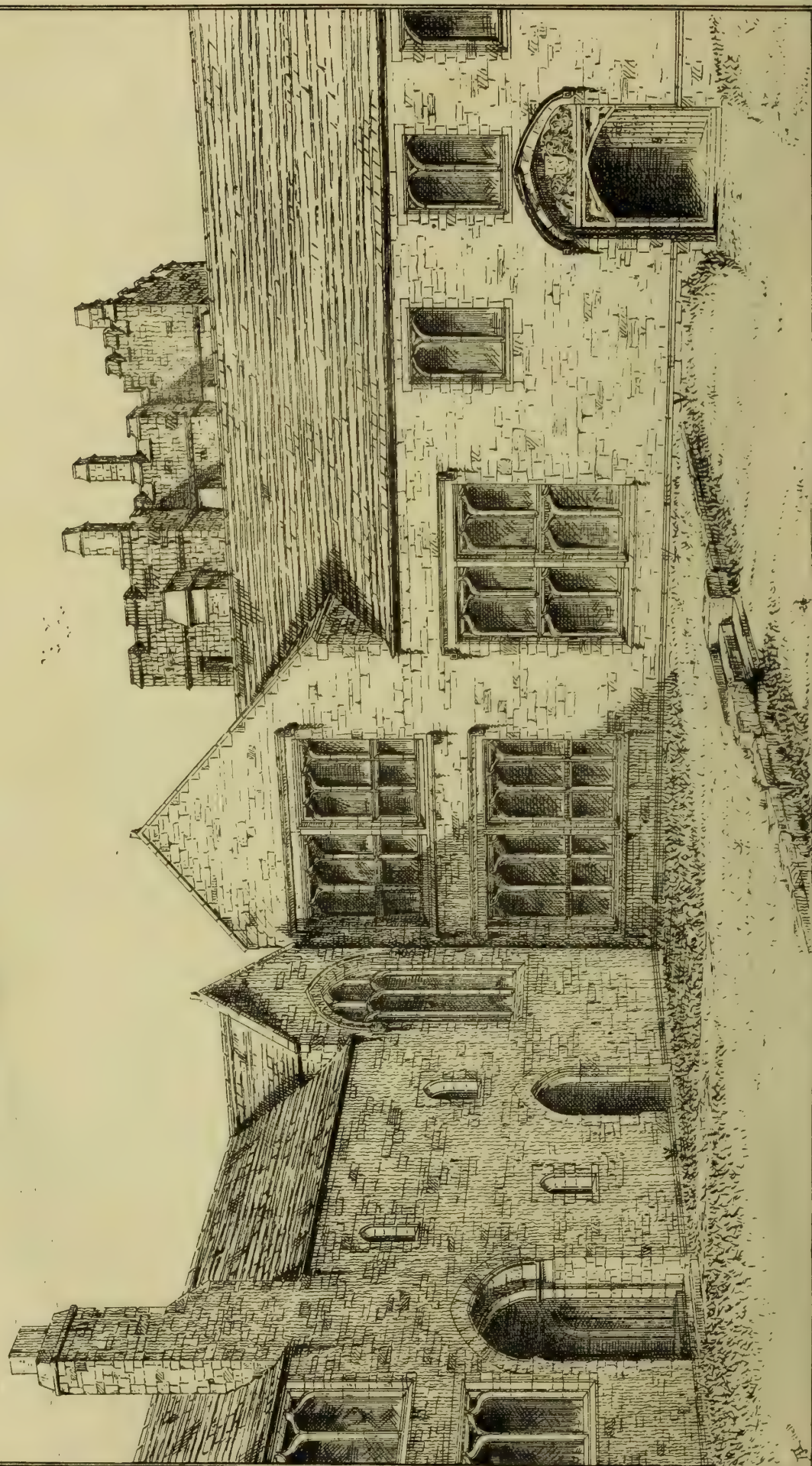


VIEW · OF · THE · GRAND · STAIRCASE  
W. H. CROSSLAND ARCHTCT.





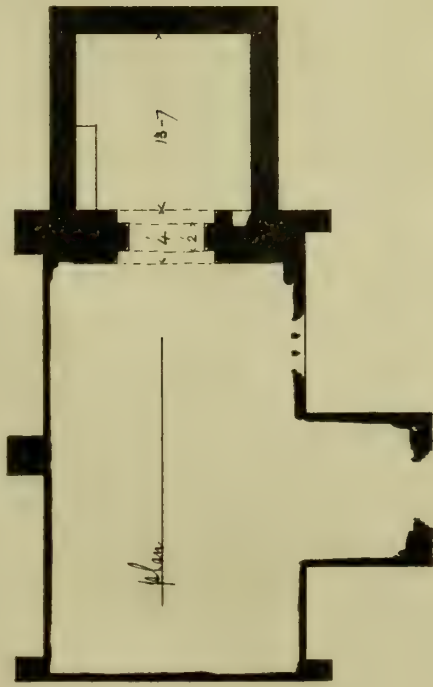




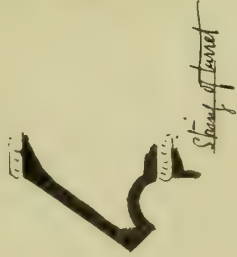
The Court of Cotehele House from the Gateway (Cornwall)



West Littleton measured & drawn by J. W. Gorton



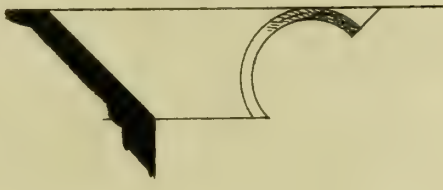
West tower  
& East side



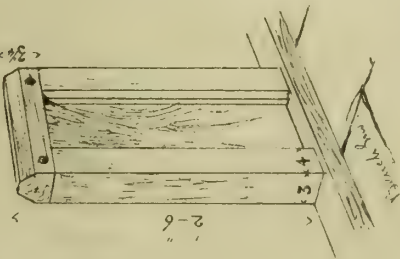
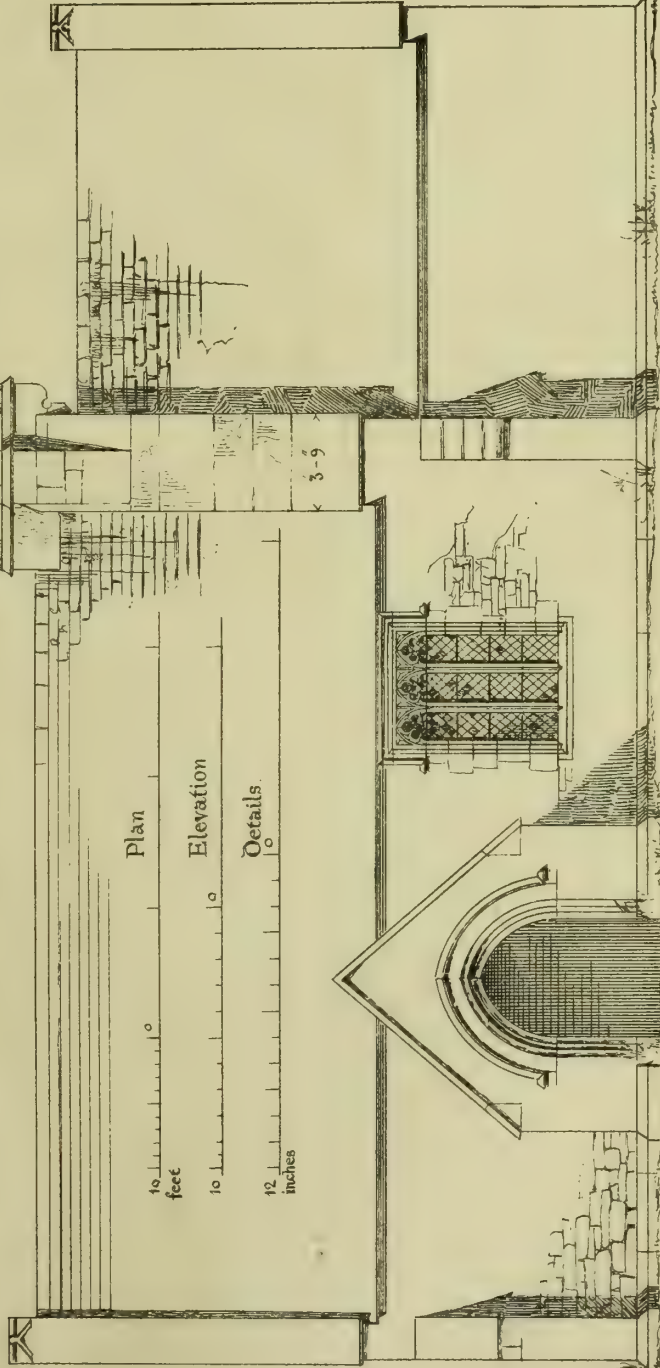
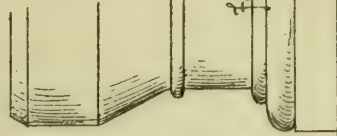
High mould of lantern



Chancel arch



Font



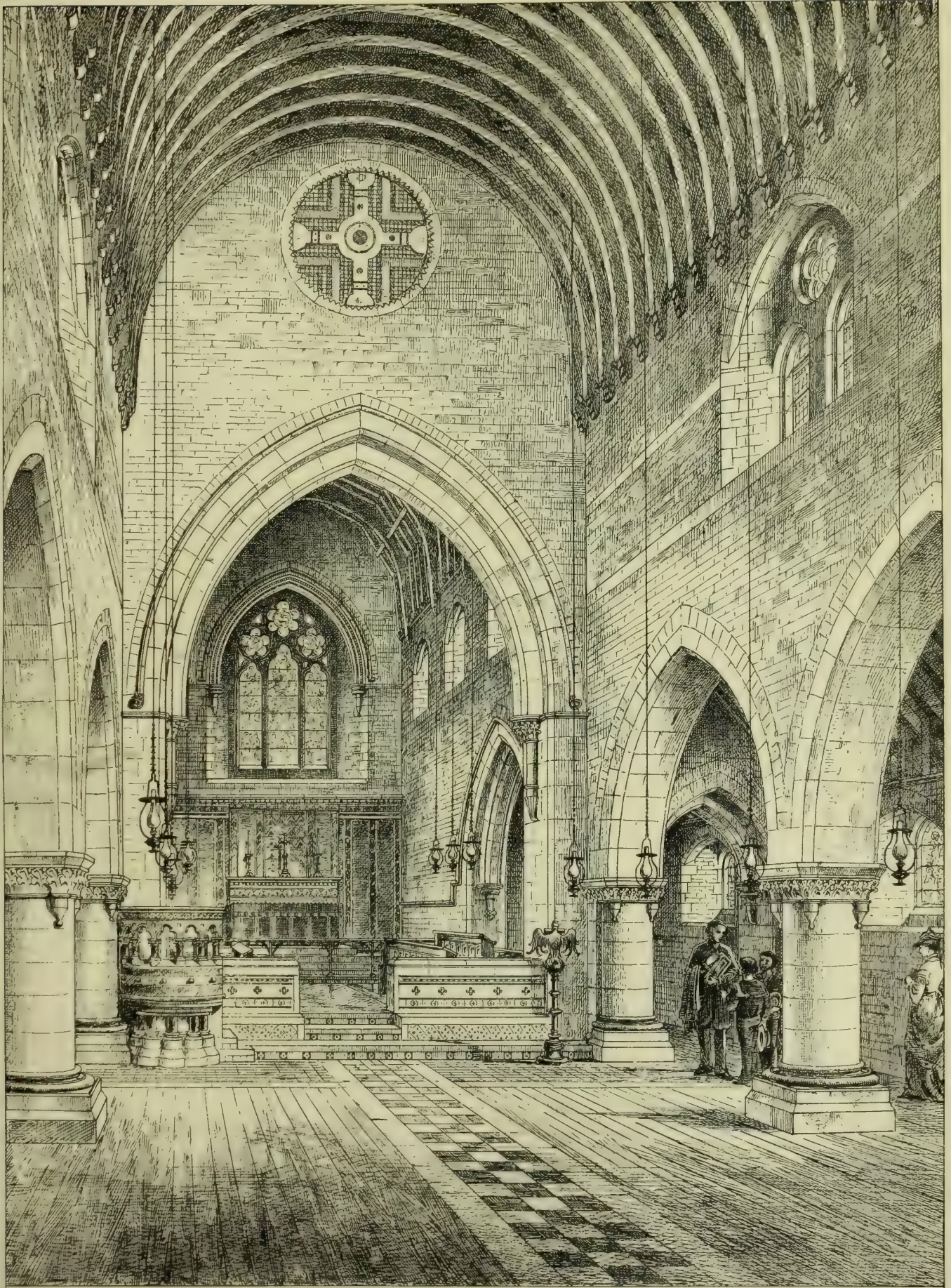
floor line

South elevation









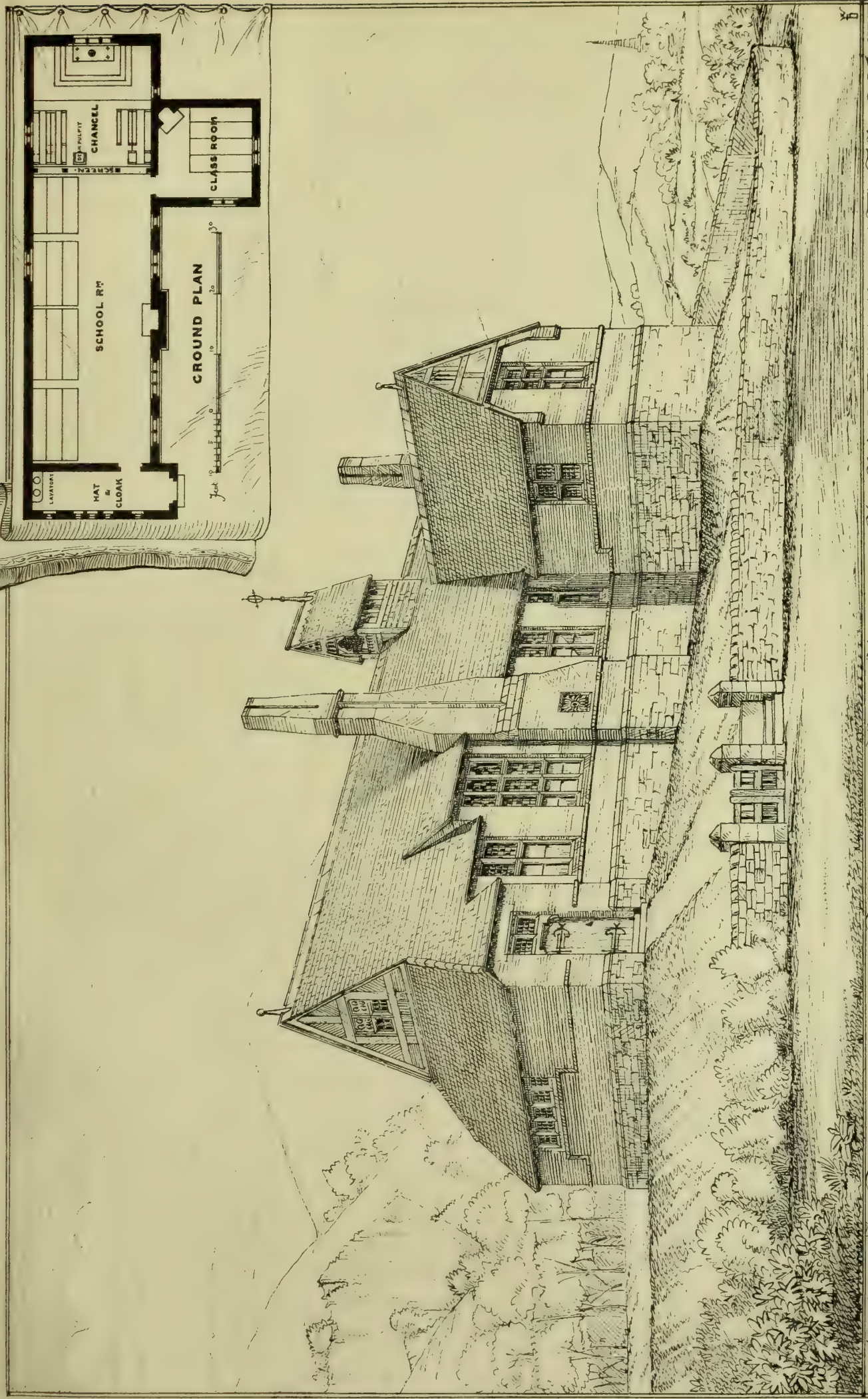
ALL SAINTS CHURCH, PERRY STREET, NORTH FLEET.

view of chancel. James Brooks, Architect, Serle St. W.C.



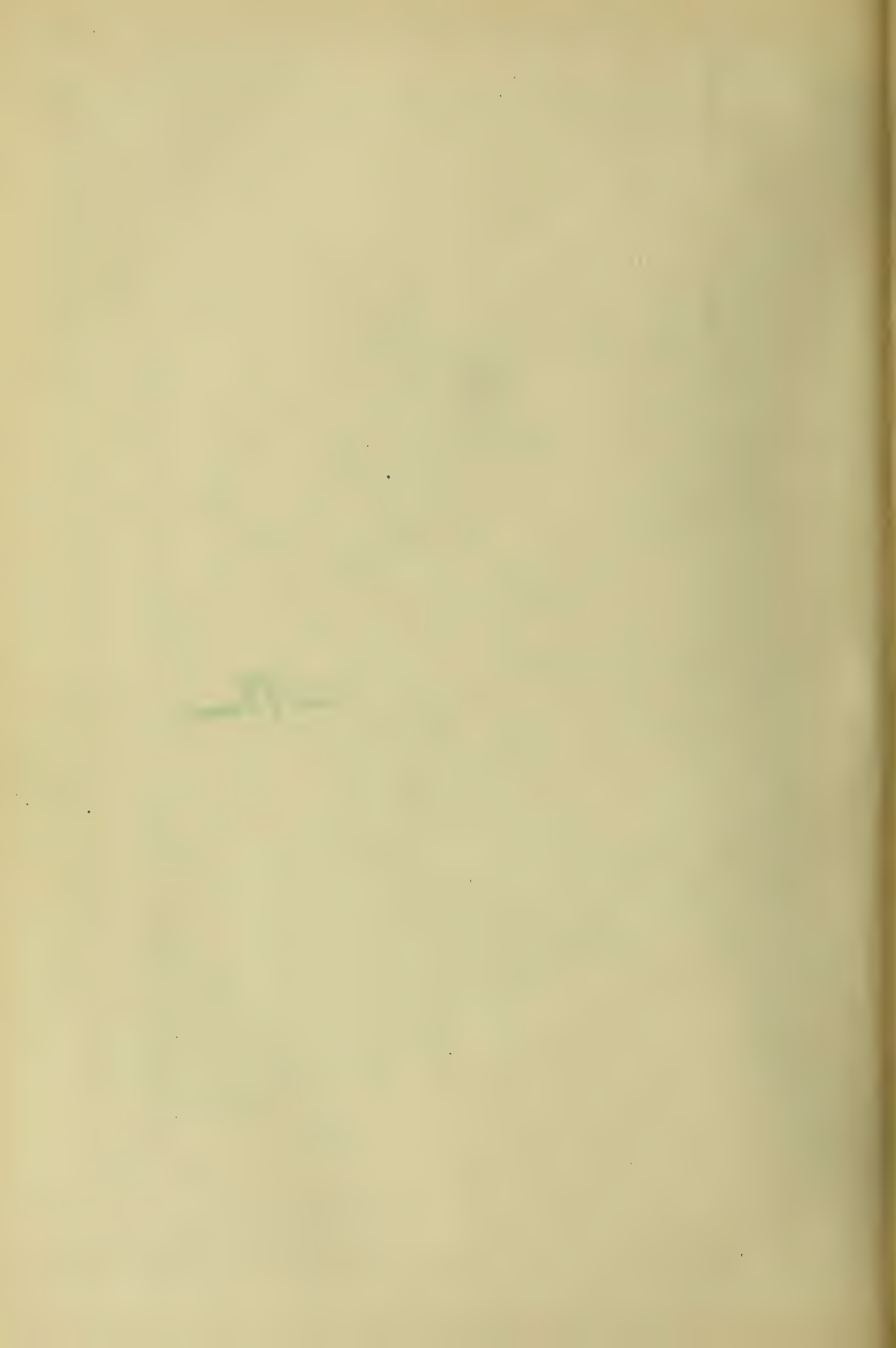






School: Chapel: for: Sir Lionel M. S. Pilkington: Bart: W. C. Brungioyn: Archt: 78 1/4







## ARCHITECTURAL ASSOCIATION.

THE first ordinary general meeting for session 1874-5 was held on Friday last, at 9, Conduit-street, the President, Mr. G. H. Birch, in the chair. Twenty-five new members were elected, and several more nominated.

## THE ANNUAL REPORT.

The annual report, which was adopted, states that the Committee again see cause for congratulation in the general condition of the Association, the spirit of fellowship among the members, and the self-regulating and self-sustaining power shown in the several branches. Nearly eighty new members were elected during the past year, and this might be considered conclusive evidence that the Association was now annually joined by a large proportion of the students entering the profession, as well as by others, and that all felt the benefit of the friendly intercourse natural to such an association. The detailed statements as to the work carried on showed the various directions in which the energies of the student-members were expended. In the past session, as before, much useful stimulus to exertion, much friendly rivalry in careful study, and many opportunities for comparing and estimating the conclusions arrived at in private reading and thought, had fallen in the way of those members who had joined heartily in the work of any of the branches of the Association. The library continued to increase in prosperity and in the number of its readers. Several presentations had been made, and many books had been purchased. In the Classes of Design some good drawings were submitted, and the elementary class was especially successful, both in the attendance of its members and the quality of the work done. The Class of Construction and Practice was carried on steadily throughout the session. The Class for the study of Colour Decoration was held, and the interest felt in the subject was shown by the number and quality of drawings produced. Visits were made on Saturday afternoons to many buildings of interest while in progress. They were much appreciated by members as a means of study, and, as usual, were very well attended. The fifth annual excursion took place under the direction of Mr. Edmund Sharpe, whose services as leader of these excursions were so justly appreciated by the Association. About sixty gentlemen availed themselves of the opportunity afforded for a tour in France in the month of August. The party met in Paris, and visited Senlis, Beauvais, Nantes, Evreux, Chartres, Laon, Rheims, Soissons, Chalons, Rouen, and other towns, and a number of villages. They were, throughout their visits to the various buildings at these places, received with much kindness, and every opportunity was afforded for the careful study of the characteristic architecture of the country. The "sketchbook" had arrived at the end of its seventh year of publication, having been carried on regularly during the past session. The arrangements made for the benefit of country members had been continued. There were facilities for obtaining books from the library, and for joining in the work of the various classes.

Reports from the various classes were also read and adopted.

## THE PRESIDENT'S ADDRESS.

The President, Mr. GEORGE H. BIRCH, then read his inaugural address. After a few introductory remarks, he proceeded to review the condition and prospects of the Association at some length. In the course of this part of his address, he incidentally referred to the subject of criticism, of which, he said, there was far too much in the architectural profession: sharp, unhealthy, and, above all, superficial. Rightly used and properly directed, it was a good thing; but how often was it misused and misdirected! There was no other profession so subject to this false criticism as that of architecture. If, however, architects wished for less of this criticism from the outside world, they should be lenient to one another, and not review each other either in a "Quarterly," "Fortnightly," or "Contemporary" manner. Referring to the excursion to France, a few months ago, under the able guidance of Mr. Edmund Sharpe, he said it was impossible to overrate the educational value of such outings to all who took part in them. In December next Mr. Sharpe would give a lecture on the lessons of the buildings visited, illustrated by a number of sketches by several gentlemen who had taken part in the excursion. Referring to the Voluntary

Architectural Examination, the President strongly impressed upon the members the importance of making their studies in the various classes, &c., of the Association of such a character as to qualify them for passing that examination with proficiency, if not with distinction. Out of about 60 candidates who had passed, 43 were members of the Association, 14 were residents in the country, and only three were London men not members of the Association. The President said he believed strongly in an architectural examination, although he did not think it should be a voluntary one. The Royal Institute of British Architects, as the representative and chartered body of the profession, enjoyed all the *éclat* with which the high professional ability of its members surrounded it, and feeling that students required something more than seeing their names enrolled in the scanty list of candidates who had passed and received a certificate, proposed that in future a candidate who had passed in both divisions might, on becoming a member, be entitled to the designation of "Graduate of the Royal Institute of British Architects;" in other words, might add "G.R.I.B.A." after his name, instead of F.R.I.B.A. or A.R.I.B.A. He believed firmly in an examination, and wished it were possible that "A.R.I.B.A." meant as much, covered as much, and conveyed as much, as "M.R.C.S." or "M.R.C.P." Those letters really meant a stiff examination after a regular course of study. After referring to the collection of drawings, models, and maps belonging to the City of Paris, which were to be seen in the late Exhibition, Mr. Birch referred to the Commission of Ancient Monuments, organised by the late M. Guizot in order that the ancient buildings of France of all epochs might be inventoried and classified, and accurately described and illustrated, and maintained in good repair. There had been an unsuccessful attempt to get a similar commission appointed in England, but it was to be hoped that future efforts in the same direction would be crowned with success. Among the many exquisite drawings sent to England through the exertions of the Commission, it was difficult to say which were the best. Those of Mont St. Michel, St. Nectaire, Puy le Dome, and the Chapel at Vincennes, were particularly noticeable. Looking at such representations of old work as these, and at the wonderful field of study which French architects had thus so readily at hand, it was surprising, when a new cathedral was wanted at Marseilles, that the design carried into execution should have been chosen, as it had not a single redeeming feature; it was at once heavy and fussy, with a façade recalling a railway station and a Turkish mosque, and utterly without that dignity and stern expression of repose so imperative in a Christian cathedral. Why, in this case, should the architect have adopted the Romanesque style, but omitting all its best features? Was it the result of "fashion" in architecture? The late competition for the Church of the Sacré Cœur on the Buttes Montmartre would seem to show such a tendency; for a very beautiful design in a free Classic style, and marked by great originality, was not "placed," the premiated sets being all more or less Romanesque. Indulgence in the same flight of fancy as that pursued by Professor Kerr a week ago would lead one to augur from this circumstance that one of those wonderful changes were coming over French art, and that it was undergoing the same process as our art. As "Queen Anne" was, according to the Professor, gradually leading us into the paths we should go, so, perhaps, after the long Classic tyranny in France, Romanesque would prove to be but the portal through which future French art would pass to full Mediæval. Reverting to a subject touched upon before, Mr. Birch said he hoped that a Commission of Ancient Historical Monuments might soon take its place as one of the permanent institutions of the country; for it would be of inestimable value to have all our existing buildings possessing any historical or architectural interest thus preserved from further injury, and protected from private greed or public "improvement." The removal of Northumberland House was to be regretted, especially as the "improvement" to be effected would be of questionable value. The mania for destruction on the plea of public improvement had extended to the City, and several churches had been demolished, while others were marked for destruction. Axes and hammers, and picks to boot! Never mind the carving and excellent workmanship of old! What a splendid site for a bank! A church had

stood there for ages; but it must give way to the National Bubble Association, or the General Provident Swindling Company, who would occupy the site till they failed. Only think of the value of the ground-rents! The removal of these old churches was now taken quite as a matter of course. One of the leading architects of the day had been assailed in articles without number, and the whole wrathful indignation of the Press had been brought to bear on his defenceless head. He had been reviewed by the Ishmaels of the profession, condemned in the columns of one paper, and his dismissal demanded by another. What was his crime? He was supposed to be in favour of *tampering* only with the work of Sir Christopher Wren as exhibited in one particular building; while the works of the same architect were elsewhere carried away by cartloads without a word of disapproval, not a protesting voice, on the part of the Press. A great fallacy continually being repeated by the Press, Members of Parliament, and others of exalted position, was that we suffered greatly from the want of unity of design in our public thoroughfares. By all accounts, our finest streets were irreparably spoilt by the want of this unity of design in our street façades, but he could hardly think this was a fault. We had streets where unity of design had been carried out; Regent-street, King William-street, and Moorgate-street were the painful results, the only good points about them being that neither was the fashion uniform, nor the time of painting identical, so that a certain amount of effect was obtained in the monotonous row by one house being as brilliant as white and stone-coloured paint could make it, while the one next door was coated with successive years' deposits of soot, dust, and mud. Uniformity of design had been tried under the most favourable auspices in the new streets and boulevards of Paris; and even there, with all the advantages of a clear atmosphere, and strong effects of light and shade, the result was not satisfactory. Turning to the London streets, where this principle of uniformity had not been attempted, and where the glorious system of narrow frontages and doing that which was right in one's own eyes by shooting up beyond your neighbour, or modestly nestling under his shadow, was carried out to the letter, without the advantages of a clear atmosphere, &c., was the result unpleasing? He thought not in the eyes of those who appreciated the picturesque. To mention certain portions of the Strand, especially near the Adelphi, and again further towards Charing Cross station; Fleet-street, looking east from Temple Bar; and, above all, Cheapside; who would exchange the marvellous groupings, quaint irregularities, and wonderful plays of light and shade—a brick façade here, a stone one there, a gabled and projecting storied remnant of old London there: a church, a bank, a shop—all mixed up, and yet presenting a most harmonious whole, lit up with a tender, soft light, with distances melting into mist—effects not to be seen elsewhere; who would exchange these things for uniformity of design, where block succeeded block like regiments on parade, tiresome in their effect and wearisome in their monotony? With reference to competitions, Mr. Birch said that although he never went in for a competition, he knew enough about them to make him view them as the *curse* of the profession. Theoretically, they were so grand! Think of being the "best man" in a competition! Of having the "best design!" But, practically, what became of the "best man" and "best design?" Why they went to the wall. Why did the public so often give architects the cold shoulder? Because the public knew some disagreeable facts about architects, as evidenced by such circulars as the following, which were lithographed by the promoters of competitions to send to the swarms of applicants:—

Little Peddington Parish Pump Public Competition.

Sir,—In reply to your request for particulars of this competition, I regret to say we have no more forms, over two hundred architects having already been supplied.

Signed on behalf of the Building Committee of the Little Peddington Parish Pump Public Competition.

This circular was no mere travesty, but a fact, the name only being altered. Over 200 architects had applied. What opinion could the Little Peddington Committee have of architects after that? According to the public, architects were all ready to circumvent each other and cut one another's throats. Was not competition the cause of such a belief? Take another instance: A church was to be built; a limited number of



architects are invited to send in designs, but they would only compete on condition that a professional man of known ability and integrity was appointed judge. The Committee agreed; the designs were sent in; and the award arrived at after much sifting of the several designs. "In Memoriam" was put first, as having kept within all the requirements of the particulars supplied as to cost, accommodation, &c. The Committee set aside this decision entirely, and chose for themselves the worst and most expensive of the designs; the one that they had settled all along should have the premium. This was no imaginary case, but a fact. Hastings Town Hall, Cardiff Free Library, Addiscombe Church—where were all these competitions? Consigned to limbo; to rot in the Stygian lake of past competitions, that would only stink if stirred. Architects had the remedy for this in their own hands. Let them be wise, save their toil and pains, and avoid competitions, no matter how tempting the bait. In conclusion, Mr. Birch expressed the belief that architecture was making real and rapid progress; sounder principles were daily gaining ground. There was a greater demand for architects' services, and they would be called in now where only a few years ago an architect would not have been thought of. The architect of past days was a man whom only the titled and great knew anything at all about; he was thoroughly conversant with the form of Greek curves; could talk learnedly about the Parthenon or the Choragic monument of Lysicrates. Jupiter Stator and Fortuna Virilis were household words in his mouth. He might have been pedantic, but he was always an educated, refined, and travelled gentleman, who could produce an exact copy in Portland stone or cement of any temple of antiquity his client had a fancy for. He was not in advance of his times, but equal to them. Times had altered greatly, and construction, through the use of new materials, had altered with them. It was therefore a vital necessity that young architects should seek to educate themselves as perfectly as possible, in order that they might keep pace with the times.

A few remarks from Mr. Phené Spiers and Mr. Lacy W. Ridge, brought the meeting to a close.

#### CAPE COLONY.

(From Our Correspondent.)

THE Commission has at last decided upon the site for new Houses of Parliament, and further have reduced the competition for premiums to the two designs, "Spes Bona" and "Alma," "Spes Bona" being the favourite. Mr. Jenour, C.E., of the Table Bay Harbour Works, has been engaged to estimate the cost of carrying out each design of the two named, and if the amounts be found to be within the limit given, one of these will be accepted, and in all probability at once carried out. The design "Economist," specified to be carried out in concrete, has met with much favour, especially the elevations, but exception was taken to some of the internal arrangements, and it was further feared, after a careful estimate of cost, that it could not be carried out for less than 50 per cent. over limit. I shall hope to report the final decision of the Board by next mail. An advertisement has appeared calling for tenders for the construction of the several lines of rail voted by Parliament. This advertisement will appear, too, in English journals, and particulars may be obtained of the Crown agents, in Spring Gardens. Mr. Gregory, C.E., Gt. George Street (Consulting Engineer to the Colony), has received almost carte blanche authority to send out a number of engineers and surveyors at once, and hard-working men who do not object to colonial roughing will find this a good opportunity for employment and gaining experience. A number of German and Belgian workmen are also to be sent out to assist native labour, and it is hoped that new railway work will go on with spirit.

Contracts have been taken for the erection of two of the Orange River bridges by a colonial gentleman, on behalf of a large English Company.

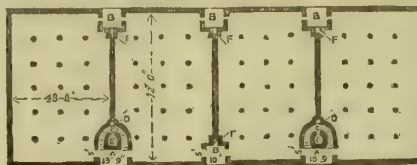
I need not weary your readers by any minor details of public works in the colony, so my letter this time is short. May I say I shall always be glad to answer any queries to the best of my power that may be asked upon matters connected with the Colony?

Cape Colony, October 4th, 1874.

#### THE CONSTRUCTION OF WAREHOUSES AND WORKSHOPS.\*

(Continued from p. 485.)

THE reader will be enabled the more easily to comprehend how a block of any number of warehouses or workshops may be built so as to enable the whole to be worked as one vast building without the aid of internal openings in the party-walls, by referring to Fig. 2, which is a block plan of a set of four warehouses designed by the writer. The internal dimensions of each warehouse are 72ft. by 48ft. The tops of all the windows are kept low, the floorings are on the Lancashire system before described, and there are no doors excepting those leading on to the open platforms A and B. The length of the platform A is 13ft. 9in., and of the platform B 10ft.



These platforms (built entirely of brickwork and concrete in Portland cement and burnt ballast, so as not to be liable to be damaged by the action of fire) not only form a duplicate means of communication between the floors on the same level of all the warehouses, but also make convenient receiving and delivering stages for the goods.

In connection with the platform A is the staircase C and the compartment E. The stairs are only 3ft. in width, as all the goods will be received and delivered by crane on or from the platforms. By means of these stairs the roof may be reached from the basement.

The recess marked D at the back of the steps is for the reception of a 4-inch fire-main, and the gas piping, should any be required. The fire-main will be supplied with a hydrant or fire-cock (fitted to take the screw couplings of the regulation hose of the London fire brigade) at the level of each floor. The fire-main will be properly protected from the action of frost.

The compartment E is conveniently situated for being utilised either as a lavatory, office for the foreman warehouseman, shelter for the night-watchman, or as a store for the fire-keys, hose, nozzles, and other requisites for the firemen. In a small building the width of the stairs might be reduced, and the compartment E dispensed with.

In the recess F, on the platform B, which recess is 2ft. 3in. by 2ft. 3in. in dimensions, a perpendicular iron ladder is fixed against the brickwork. This ladder affords the warehousemen and labourers an expeditious means of communication between the several floors of the building. There is sufficient room in the corners of this recess for fixing a fire-main and gas pipes, should it be deemed expedient so to do.

The circumscribing walls of the compartments containing the platforms A and B are to be carried up above the level of the tops of the flat roofs of the main buildings for a sufficient height to form chambers to take the steam machinery for working the lifting and discharging cranes.

A boiler of the vertical type fixed in the chamber, over either of the isolated compartments containing the platform A, will be capable of supplying steam to all the six sets of cranes, as the distance between the boiler and the farthest off of the cranes will not exceed 120ft.

A boiler being placed over both of these compartments, there will always be a boiler in reserve, to enable the other to be thoroughly cleaned and kept in a good state of repair.

A tank, covering the top of one of the larger of these sets of crane-houses, will contain, when filled to the depth of 4ft., upwards of 30 tons, or 7,000 gallons of water; and the tops of the smaller chambers could be covered with tanks that would each contain about 13 tons, or 3,000 gallons of water, when filled to a depth of 4ft.

The system of having the receiving and discharging stages and the means of communication between the various floors of warehouses and workshops external to the main buildings, not only reduces to the minimum the danger of any conflagration that may break out in one compartment extending to the goods in the other com-

partments, but gives every facility to the firemen and others for subduing the same by enabling them to gain easy and safe access to all the compartments surrounding the one in which the goods are being destroyed.

Should the water-tanks on the top of the crane-houses be full or only partially filled, and the fire-main, hydrants, hose, &c., in efficient order at the time of the outbreak, they would be of great assistance to those on the spot; but should the conflagration, before being discovered, have assumed such dimensions as to render indiscreet any attempt to quell it except by the organised exertions of the fire brigade, then the firemen, upon their arrival, and pending the completion of their own arrangements, would at once find in them useful and ready assistance, and, even after the fire-engines had been brought into play, valuable auxiliaries. Assuming both the flooring and the ceiling to be either absolutely or practically fireproof (brickwork or Lancashire flooring respectively), no conflagration of any ordinary character, even if fed by goods of that very combustible class, stored household furniture, which so considerably facilitated the destruction of the late Pimlico Pantehnicon, could, while so isolated, long withstand the systematic efforts of the fire brigade. From the tenor of some of the letters that appeared in the public press, both scientific and general, immediately after the occurrence of the great fire in Pimlico, on the subject of the best means to be taken by the proprietors of warehouses, &c., in order to render less liable the recurrence of like disasters, it would appear as if the effects of damp, not to mention those of running water, were not to be dreaded by the owners of the valuable articles of commerce that are frequently and necessarily kept in hand for a very considerable length of time. But, as a matter of fact, the ravages of water are much more to be feared by merchants and proprietors of warehouses than those of fire, for not only are damages to all kinds of merchandise from damp and wet of far more frequent occurrence than their destruction or damage by fire, but, whereas a merchant of discretion may, and very usually does, assure himself against loss in the event of his wares receiving damage by fire, he has no such opportunity of insuring their value being paid to him should they be injuriously affected by water, except, indeed, where the damage by water is an alternative to the danger of destruction by fire, in which case he is covered by his policy of assurance, which covers damage by fire and the accompanying risks.

So that by placing the water-tanks on the top of the exterior buildings instead of on the top of the warehouses themselves, and by having the fire-mains outside of the warehouses, a means of security against fire is furnished to the proprietor unattended by any liability of damage to his goods by the leakage of the cisterns or the bursting of mains in times of frost. And thus the proprietor, no longer fearing the effects of water, will have an interest in seeing not only that the means of arresting the progress of any fire are provided, but also, that being provided, they are kept in efficient working condition; and in that the building is thus properly provided with means for checking a conflagration, he has a basis of negotiation for more favourable terms from the assurance companies.

That fear of damage by water is very rife is indisputable. How many fires occur in buildings provided with cisterns, hydrants, hose, and other apparatus for the quenching of fires? And how often are these appliances rendered useless by the simple fact of the cisterns being empty? Are we to suppose that negligence accounts for the want of water when the water is needed? Is it natural to suppose that they who have provided means for the storage and distribution of water everywhere have almost invariably unintentionally neglected the storage? To whose interest, assuming the building and goods to be fully assured, is it that the cisterns should be full? Surely not the proprietor's, without this risk of damage by water is a myth; so that until the insurance companies offer better terms in consideration for an adequate supply being stored on the premises, such will never become the general practice.

The first crude ideas of any engineer or architect desirous of providing for the storage of water for use in these cases of emergency, naturally suggest the formation of one large cistern, or a series of smaller cisterns, on the roof of the building; but the fact of so many cisterns being empty when water is required, combined

\* By W. C. HOMERESHAM, C.E., in Iron.



with the well-known repugnance of merchants and warehousemen to damp, prove conclusively that the system is not nearly so desirable as that of having the roofs of the out-buildings alone utilised in this manner, which admits of the storage of water so as to be always accessible to the firemen or agents of insurance companies, even when the warehouses are closed, and this, too, without any risk of damage to the goods stored in the warehouse.

**ERRATUM.**—On page 456 at the close of the paragraph on the weight of rice, for "38cwt. per cubic foot, or '76cwt. per tier of 'bags,'" read "4cwt. per cubic foot." Rice when cleaned is packed in bags, which stand about 2ft. in height, and stow at the rate of about 38cwt. per cubic foot, or '76cwt. per tier of bags per foot superficial.

(To be continued.)

## THE RESTORATION OF YORK MINSTER.

ONE of the most important restorations which have been effected in York Minster is that which has just been completed in the south transept, under the direction of Mr. G. E. Street, R.A. The cathedral was founded by king Edwin, the first Christian king of Northumbria, in 626; and there have been a number of restorations in the building since that time. The earliest was undertaken by Wilfrid, who was made Bishop of York in 669. In 1069 the Minster was seriously injured by a fire, which burnt a great part of the city and Cathedral library. After this it was restored by Archbishop Thomas, and it continued in prosperity until the year 1137, when a casual fire began in the city which burnt down the Cathedral again, and, along with it, St. Mary's Abbey and 39 parish churches. The present Cathedral was commenced in 1215, and was erected on the ruins of the previous edifice. The south transept was built by Archbishop Walter de Grey. This is the oldest portion of the Minster, and a pure specimen of Early English architecture. From the time of Archbishop Walter de Grey to 1530 the Cathedral was in constant progress, no period passing at which some material part of the fabric was not assuming the magnificent form it now displays. Considerable improvements were kept up until 1829, when a large portion of the edifice was again destroyed by fire—the work of an incendiary named Jonathan Martin, a native of Hexham, in Northumberland. On this occasion the cost of the restoration was £65,000, and the Minster was formally reopened in 1832. In 1840 it was again on fire, which was discovered to be raging in the south-west tower, where was a noble peal of 10 bells, and also the striking clock. The bells were burnt from the beams on which they were suspended, and fell with a terrific crash into the fire below, where they were destroyed. The same fate attended the clock. The fire destroyed nearly the whole of the roof of the nave, but was prevented from extending to the rest of the building. Thus in the two later fires the south transept was not damaged. The cost of the restoration on the last occasion was £23,000. Of recent years it had been more and more noticed that the south transept had become sadly out of repair, and that it would soon become unsafe unless steps were taken to restore it. The first part of the work entered upon was in connection with the south front and east aisle, the decayed and mutilated condition of a portion of which rendered it necessary, with a trifling exception, to be entirely replaced by new work. The clerestory walls were found to be in a dangerous condition; the process of decay was fast hastening their disintegration, and the manner in which the walls had been originally built was shown to have not been sufficiently strong to resist the pressure upon them from above, the result being that they were pushed outwards and overhung to the extent of ten or twelve inches. The greater part of the exterior of the clerestory walls is new work, as well as much of that adjoining. It was found necessary, in order to strengthen the walls, to block up the open passage, which extended the whole length of the clerestory, by doing which the walls were increased in thickness to the extent of 14in. They have now been rebuilt in the strongest possible manner. The whole of the Purbeck marble shafts in the clerestory are new, as well as the greater part of the abaci. These were only discovered to be marble when pulling down the walls. The amount of new Purbeck marble which has been placed in the transept is

upwards of 1,180ft., varying in diameter from 4½in. to 7½in. The old slated covering of the roof over the centre part of the transept has been replaced by one of lead. The interior of the roof has also been considerably strengthened by the addition of extra braces and trusses. The west aisle roof, which was formerly of slate, has also been superseded by one of lead, and the roof raised to its original pitch. The lath and plaster ceiling has been removed, and replaced by one of oak, and the old bosses and groining have been repaired where necessary. These bosses contain excellent specimens of foliage of mediæval workmanship. The decoration employed is an exact reproduction of the original; the foliage has been gilded, and the background picked out with vermilion. Parallel lines of vermilion are placed on each side of the groined and ridged ribs throughout the whole of the ceiling. The whole of the whitewash has been removed from the masonry and carvings of the entire transept, by which process a great amount of Purbeck marble was discovered. The gasfittings for lighting the transept have been fixed on the string-courses of the triforium. £11,000 has already been expended on the restoration; £14,000 was the result of the Dean's appeal, but a continuation of the restoration of the external portion of this part of the edifice will make a further appeal necessary.

## BUILDINGS OF ADOBE BRICK.

**A**DOBE is pronounced as if it were spelt doby, and adobe bricks are made of soil selected for the purpose, generally a mixture of clay and sand, and they are dried by the heat of the sun. These bricks can be, and frequently are, used for building through all the west half of North America. The reason adobe is suited to this region is because there is never rain and moist atmosphere enough to dissolve, or in any manner affect their durability, though Northern California is an exception, for there the Fall rains are occasionally so prolonged that this material is unsafe, and some houses built with it have fallen, or rather melted and sunk into the original mortar.

With the Mexicans, adobe is a favourite material; they build stables, dwellings, and churches with it, and there are adobe houses in Santa Fé and El Pasco erected 200 years ago, which are apparently as firm as when first put up. All the forts of the fur traders, such as Bent's, Lupton, St. Vrain, and the like were adobe, and although they were vacated nearly twenty years since and dismantled, having no kind of protection on the top of the walls, the rains have made but little impression upon them. But it is usually considered necessary that the top of an adobe wall have a cover of wood, or of stone, or of burned brick. At Salt Lake the old Temple was adobe, and so also the high wall around Temple-square, while other structures and dwellings, many quite costly, are of the same material. At present, however, all the business blocks are of burned brick, not perhaps because such are more durable, but because a great obstacle is presented in rain storms coming unexpectedly while the adobe are drying or are laid in the wall, since if a rain is heavy the whole are likely to go to ruin; therefore, they who are able and who are in a hurry cannot afford to run risks.

Still, adobe is the poor man's material, and a house once built of it is lasting, and it is comfortable in the extreme; for, as the bricks are laid in mortar of the same material, the wall becomes as firm as if of one unbroken mass; indeed, it is more solid than a wall of burned brick. The rooms are warm in winter and cool in summer, and the fierce and terrible winds blowing for days together are unfelt and unheard. When an adobe brick is thoroughly dried, which in summer requires about a week, it is hard and heavy, and it rings under a trowel almost like a burned brick. If put in water it will return to its original mud in about thirty minutes; but while in a wall, and having been thoroughly dried, the ordinary rain of the country may beat on it all day and make no great impression. However, those who live in adobe houses are always willing to have the rain stop, unless there is a porch or other projection.

The Salt Lake people devised a plan of plastering the outside with lime mortar, but it was not until they had made many experiments; for adobe plastering, though good for the inside, is worthless outside, as it washes quickly away, and

lime mortar will not stick; but when shingle nails are driven into the wall 6in. apart, then the mortar sticks, making an excellent stucco, and being painted or whitewashed the finish is beautiful; there is no more trouble, and the wall may be considered as indestructible as anything on earth. It is likely that an adobe building, well constructed and protected, will last thousands of years, for the material becomes so hard that no part of it wears away or crumbles. In New Mexico the women perform the duty of repairing the walls every spring by plastering over such part as have suffered injury from beating rains or other causes, and the work is slight, for it is only required to mix the soil with water and lay it on in mortar.

One might at first suppose an adobe house extremely cheap, made as it is of a material that costs nothing, and which is under one's feet; but this is not exactly the case, for the labour is so hard and the process is so long that those not accustomed to working in adobe are apt to get discouraged, or they may work so rapidly that the walls break down before they are dry, or a sudden rain may spoil many bricks ready for use; hence it has resulted that adobe ceases to be popular, especially with Yankees, and they forego all the benefits on account of the difficulties which they have not the patience to overcome.

It is indispensable that lumber shall be on hand to keep adobe brick from getting wet. It is true that months may pass when no rain falls, and during which they will become thoroughly dry; but there is a risk, and it is probably true that no pursuit carried on by day labour can be continued if there are risks. Only capital can afford to run risks, if they are profitable. When several thousand adobe brick are laid out in a yard to dry they become strong enough in a couple of days to be ranked one on top of another, so as to admit the air and yet to occupy a small space; but boards must be ready to cover them in case of rain. This is said of such bricks as are of the size of burned brick, but experience has proved that a larger size is more profitable, and such are usually made. These will require four days to dry so that they can be moved, and it follows that the expense of covering small ones which occupy greater space is nearly balanced by the risk and time involved in making larger ones, and the difficulties are about equal.

## SCHOOLS OF ART.

**BELFAST.**—The collection of landscape drawings and studies from nature done during the year by the members of the Ladies' Sketching Club, in connection with the Belfast School of Art, was on view last week. The following is the list of awards:—A. For best set of sketches, 1st prize, Annie Caldwell; 2nd prize, Rosetta Ferrar; 3rd prize, Mrs. Everett. Honourable mention—1st, Ella Hodges; 2nd, Annie McCann; 3rd, Charlotte Duffin. B. For best landscape in colour, &c.—1st, Mrs. Lindsay. Honourable mention—1st, M. Macpherson; 2nd, Ella Hodges; 3rd, Annie M. Shaw. C. For best single landscape in chalk or pencil—1st, Annie Caldwell; 2nd, Marie May. Extra—Susan Atkinson for architectural sketches.

**EDINBURGH.**—The annual meeting of the friends and subscribers of the Watt Institution and School of Arts was held recently. The fifty-third annual report stated that during the session 1873-4 the school had been attended by 1,134 students, being an increase of 387, as compared with the previous year. The number of class tickets sold and presented by subscribers had been 1,627, of which 1,367 were for classes during the winter, and 251 for classes in the summer session. Sixty-one prizes had been presented by and through the Watt Club. Having in view the large increase in the number of students, the directors had entered into a provisional agreement for the purchase, in conjunction with the Henderson Trust, of the site to the west of the present school, with a view to the erection thereon of a building for the use of themselves and the Trust.

**NORTH LONDON SCHOOL OF ART.**—The annual meeting and distribution of prizes to the students of the above school took place recently at No. 1, Sandringham-road, Kingsland. The sixth annual report stated that when the school opened in March, 1868, there were only seventeen pupils, but now there were 239, which showed an increase of 67 over last year. Facilities were now offered for daylight studies with the best pos-



sible results. Tuition for third grade prizes was paid attention to, and the number of prizes in that grade during the past year amounted to 18. In the technical courses there was also a steady increase, which was very gratifying, as it had a direct influence on the labours of our handicraftsmen. One student in building construction obtained a second class in honours, and in solid geometry another obtained a first-class.

**ROCHESTER.**—The distribution of prizes to the successful students of the Rochester Science and Art Classes took place on the 28th ultimo. According to the report, although the classes had been in existence for twelve months only, they already numbered 39 students, 23 of whom presented themselves at the recent Government examination; of the number one candidate passed in four subjects, one in two subjects, and nine in one subject, while certificates for proficiency were granted to five of the students. Science classes had also been established and were well attended, one of the students being successful in obtaining a Queen's prize.

**THE FEMALE SCHOOL OF ART.**—The annual exhibition of the works of the Female School of Art has just been held in Queen-square, Bloomsbury. According to the report for 1873, the school has never been in so flourishing a condition, numbering on its books at the close of the summer session no less than 194 students, the highest number which has yet been attained. The Gilchrist Scholarship has this year been raised from £15 to £50, in consequence of the proved inefficiency of the former sum to enable the successful candidate to take up her residence in London, the conditions of the trust requiring every scholar to study daily at the school during her two years' tenure of the scholarship. A new prize-giver appears on the list this year in the person of Mr. Francis Bennoch, who offers rewards for the best foreground in oil, and for the best illustrations of his own book of the "Legends of St. Alban's." The chief prize-winners this year are Miss Alice Hanslip, who takes the Queen's Scholarship of £30 for a series of studies from the life, to one of which, a study of hands, has also been awarded one of the National Bronze Medals. The Queen's Gold Medal, last year gained by the now Queen's Scholar, Miss Hanslip, falls this year to Miss Susan Canton for her study in clay of the "Dying Gladiator," and the same lady is also accredited with a Queen's Prize for another study in clay from the life. The two remaining Queen's Prizes for studies of flowers in oil have been won by Miss Ellen J. Hancock and Miss Alice A. Locke, and the National Bronze Medal for a study of flowers in water colours by Miss Jessie Corcoran. The Gilchrist Prizes for outline drawing fall to Miss Ida Lovering and Miss Emma Jones; and those given by F. Bennoch, Esq., for foreground in oil and original composition, to Miss Emily Austin, Miss Susan R. Canton, and Miss Ellen Ashwell. Third grade prizes for painting from the life and from nature have been awarded to Miss Ellen Ashwell, Miss Alice B. Ellis, Miss Anne E. Hopkinson, Miss Charlotte Austin, Miss Hannah Cole, Miss Emily Austin, Miss Ellen Hancock, Miss Agnes Jerson, Miss Annie Brissell, Miss Gertrude Hamilton, Miss Jessie Corcoran, Miss Alice Hanslip, Miss Jane Lock, Miss Julia Clarke, and Miss Susan R. Canton; and for elementary drawing and shading in chalk to Miss Catherine Adkin, Miss Ada C. Hinton, Miss Sarah Jones, Miss Mary Pritchard, Miss Martha S. Lovell, Miss Caroline Codd, Miss Emma Jones, Miss Emma Rowley, Miss Ada Lovering, Miss Emma Guilloid, and Miss Alice Oyren.

#### CHIPS.

A collection of Spanish paintings, the property of the Duke of Montpensier, have recently been exhibited at Boston (U.S.). The *Atlantic Monthly* speaks well of the Murillos and those by Velasquez, Francisco Zurbaran, and Morales, but has a poor opinion of those by Ribera, Juan Valdes, Leal, and others.

A new cemetery was opened at Crewkerne on Monday last. The lodge, chapels, and other buildings have been erected by Mr. Draper, builder, of Crewkerne, and the grounds were laid out by Mr. J. Scott, gardener, Merriott.

The Bury Town Council have appointed a committee to arrange for the erection of a new Council Chamber and other offices.

The Derby Town Council has determined to purchase 61 acres of land at Spondon for £8,200, part of the site to be used for the erection of a new lunatic asylum.

## Building Intelligence.

### CHURCHES AND CHAPELS.

**BELFAST.**—A new Wesleyan church is in course of erection at Carlisle-circus, Belfast. The building is in the Gothic style, the materials used being Armagh limestone, with dressings of red Dumfries stone. The principal entrance, which will be embellished with mouldings elaborately wrought out, and with richly-carved capitals, opens from Carlisle-circus. On either side of this door are two niches, in which will be placed statues of the Evangelists. A tower and spire rise over the principal entrance to a height of nearly 100ft.ittings are provided for 1,000 persons, all on the ground-floor, there being no galleries. The west window will be a prominent feature, it being 30ft. in height by 17ft. 3in. wide. The entire cost of the building will be between £15,000 and £20,000, and will be defrayed by Mr. Alderman Carlisle. The contract is being carried out by Mr. Henry, Mr. Lynn being the architect.

**CANTERBURY DIOCESAN CHURCH BUILDING AND ENDOWMENT SOCIETY.**—A meeting of the Central Committee of this Society was held at Lambeth Palace on Monday last. Grants of money were voted towards building a church at Matfield, in the parish of Brencley; enlarging or improving the churches of Holy Trinity, Maidstone, Brabourne, Paddock Wood, Sidcup, Sutton Valence, and West Farleigh; and towards building parsonage-houses at Markbeech and Bearstead.

**DALZIEL.**—The new parish-church at Dalziel, N.B., was opened on Sunday. Accommodation is provided for upwards of 900 sitters, about 500 of whom will be on the area floor, besides session-house, vestry, retiring-room, &c. The style adopted is the Later Gothic, in which Scotch Baronial features have been freely introduced by the architect, Mr. David Thomson, Glasgow. The total cost of the structure is estimated at £5,000.

**EDINBURGH.**—St. Andrew's Episcopal Church, Edinburgh, has recently been enlarged by the addition of a new south aisle, designed by Mr. D. Bryce, architect, in a style corresponding with that of the main building. At the same time, a baptistery has been provided immediately adjoining the chancel, the wall of which has been pierced to admit of the insertion of a memorial-window, designed by Mr. Barnett, Leith, and representing the Baptism of Jesus.

**GLOUCESTER.**—The memorial-stone of a new Congregational chapel has been laid at Gloucester. The chapel will ultimately seat 750 adults; but for the present it is divided into two parts by a cross wall, the nave alone forming in the meantime the chapel, with accommodation for upwards of 500 persons. The style is Early Gothic, the walling being of Painswick stone, lined with brick. The total cost of the building now in course of erection will be, exclusive of the land, £2,800. The architect is Mr. James Tait, of Leicester, and the contractor, Mr. Meredith, of Gloucester.

**HEBBURN.**—The new church of St. Cuthbert, Hebburn-on-Tyne, was consecrated last week. The building consists of a nave 81ft., long, 26ft., wide, and 50ft. high. At the west end a wide and lofty chancel arch is formed. The church, when completed, is to be a cruciform edifice, with nave, transepts, and chancel, affording accommodation for 600 persons; the nave now erected will seat about 300. Mr. F. R. Wilson, F.R.I.B.A., of Alnwick, is the architect.

**HURLFORD.**—The foundation-stone of a new parish-church was laid at Hurlford, N.B., last week. The new buildings, consisting of church and manse, will have an entire frontage of 150ft. The style is Early English of the fourteenth century, and the buildings are to be executed in red Freestone, from the Ballochmyle quarries. The cost of the buildings, exclusive of organ and painted windows, is £7,600, and they are expected to be ready for occupation early next year. The architects are Messrs. Ingram, Kilmarnock and Glasgow.

**MONCTON FARLEIGH, WILTS.**—The parish-church of Moncton Farleigh, near Bath, was reopened by Bishop McDougal on the 5th inst., after repairs and alterations. The church is now seated throughout with open benches of oak, the seats in the chancel being elaborately carved. The removal of the old pews was taken as an

opportunity to re-lay the floor of the nave and chancel, which was all on one level. The chancel has been raised two steps, the Communion-table two more, and the floor laid with encaustic tiles. The work has been carried out by Mr. J. Hayward, builder, of Bath, under the superintendence of the architect, Chas. S. Adye, Esq., of Bradford-on-Avon. The carving is by Mr. F. Edgecumbe, of Bath.

**PANTEG.**—Panteg Church, near Pontypool, is being enlarged, and the memorial-stone of the extension was laid on Thursday week. The east end of the church is being removed, and a chancel and north aisle with an organ-chamber attached to it, and new vestry, added. The work, as far as has been carried out, is in Glyn Valley stone. The whole is being executed from designs by the architect, Mr. W. H. Coussmaker, of the Isle of Wight.

**RADCLIFFE, LANCASHIRE.**—Building operations were commenced in connection with the erection of the New Church of St. Paul, at Black-lane, Radcliffe, on Thursday, the 5th inst. The church is to be a substantial stone structure in the Early Geometric style, and will accommodate 500 persons. Its arrangement consists of nave with apsidal chancel, transepts, passage, aisles, vestries, Baptistry, tower and spire at the north-west angle, and south porch. Mr. G. Napier, of Manchester, has undertaken its erection and completion at a cost of about £5,000, in accordance with a design prepared by Mr. John Lowe, of Manchester, F.R.I.B.A., and selected in open competition. Lawrence Hall, Esq., has generously contributed £3,000 towards the cost of its erection.

**WALTHAMSTOW, ESSEX.**—The consecration of St. Saviour's church took place on Tuesday, the 3rd instant, by the Lord Bishop of Rochester. The plan of the church consists of nave and aisles, chancel, with north and south aisles (that on the north side being appropriated as vestries for clergy and choristers), and apsidal sanctuary at the east end. The entrances are through the tower, situate at the north-west angle of the church, by a porch at the south-west angle, and by two smaller doorways on the north and south sides at the east end of the nave. The principal of these entrances is through the tower, and is elaborately groined in stone. The nave is in five bays, and over the arches is a lofty and well-developed clerestory, with a range of two-light windows with solid panels between the windows, in which are represented alternately the Holy Lamb and the Pelican, and medallions containing the various symbols of our Blessed Lord and His Passion. The western portion of the chancel is arranged as a Presbytery, and is raised three steps from the floor of the nave, the platform on which the altar stands being elevated five additional steps. The easternmost compartment of the apse has a three-light window with Early Geometrical tracery in the head, filled with stained glass by Mr. Daniel Bell, representing our Blessed Lord in Majesty, with the Heavenly Hierarchy and the peoples of the earth in the act of adoration before Him. The organ, not yet completed, will be placed on the north side of the chancel. The tower is surmounted by a lofty spire, and contains a musical peal of eight bells by Messrs. Warner, of Jewin-crescent, Cripplegate. The architecture of the church is that of the latter part of the thirteenth century, and the material of which it is built is, externally, Tisbury stone and Kentish rag walling; the arches, window dressings, quoins, &c., internally are of Corsham Down stone, and the walling of Hassock. All the doors, seats and woodwork generally are of oak, and the pavements are laid with Godwin's tiles. The church, with endowment and vicarage, is provided at the sole cost of Messrs. Knowles and Foster, of Moor-gate-street. The architect of the church is Mr. Francis T. Dollman, of 9, Adam-street, Adelphi, and the contractors are Messrs. Henshaw, of the City-road. The clerk of the works is Mr. Samuel Burbridge.

#### BUILDINGS.

**ALNWICK.**—New Baths and Washhouses have been erected at Alnwick. The façade of the whole block occupies a frontage of about 80ft., and is in the Elizabethan style. The Workmen's Institute has a separate entrance and entrance-hall. The designs for the work are by Mr. Reavell.

#### SCHOOLS.

**KIDDERMINSTER.**—On Oct. 27th the new Board schools at Kidderminster were formally



opened. The schools, arranged round three sides of a quadrangle, with master's house adjoining the infants' school, the principal front facing to Coventry-street, are in the Early Geometrical style, and built of dark red bricks, relieved with Bath stone dressings. They are lighted by large traceried windows in each gable and triplets along the sides. The roofs are covered with best Broseley tiles in two tints. The internal face of walls are of pressed brick, and coloured. The boys' school has a total length of 170ft., and is 26ft. wide, with two classrooms, and will accommodate 250 boys. The girls' schoolroom is 127ft. long and 26ft. wide, with one classroom, and will accommodate 150 girls. The infants' school is 78ft. long and 30ft. wide, with two classrooms, and will accommodate 200 infants, being arranged to accommodate a total of 600 children. The whole has been erected by Messrs. Binnian and Son, under the superintendence and from the designs of Mr. J. T. Meredith, of Kidderminster, at a cost of £4,400.

**MATLOCK BANK.**—The foundation-stone of new National schools at Matlock Bank was laid on Friday last. The buildings will be Gothic in style, with porch and tower, and a mission-room capable of seating 500 persons adjoining. Mr. S. Kedward, of Sheffield, is the architect, and Mr. Bridge, of Matlock, is the builder.

### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

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Front Page Advertisements 9d. per line.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

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(Payable in advance.)

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\* Cases for binding the half-yearly volumes, 2s. each.

Subscribers receiving their copies direct from the office are requested to observe that the last number of the term for which their Subscription is paid, will be forwarded to them in a coloured wrapper, as an intimation that a fresh remittance is necessary, if it be desired to continue the subscription.

RECEIVED.—H. G.—C. H. S.—McT. and Co.—P. and K.—W. H. S.—J. and J.—H. H. W.—J. P. K.—L. G. S.—N. H. and Co.—C. H. S.—W. J. S.—F. and Co.—A. W.—F. H. and Co.—J. J. and Sons.—J. N. & Co.—J. T.

INQUIRER (No).—ADAM SCOTT (Your reply is an advertisement).—ARTHUR CATES (Thanks for the suggestion, but it would be scarcely practicable).—JOHN L. B. (Thanks for offer to insert design for Hastings Town Hall. We must however, respectfully decline).—W. K. P. (Inquisition (No charge is made)).—EDWARD CHESTERTON (Suitable).—STUDENT (Your question is too general for "Intercommunication").—H. W. (You can get lessons on elementary mechanics at the Working Men's College, Great Ormond-street, at the Birbeck Institute, Southampton-street, or at King's College, Strand).

MANCHESTER.—We must say that we do not agree with you as we fail to see why Messrs. Mitchell and Macleod, architects, Manchester, or any other architect or firm of architects, by putting on the back of their card the names of the various works they have executed, "lower the dignity of the profession." Why should not an architect speak of the work he has executed, as well as an author of the works he has published? It is not by such means "the dignity of the profession," is lowered or compromised.

## Correspondence.

### LONDON GALVANIZED.

(To the Editor of the BUILDING NEWS.)

SIR,—A great impediment to town improvement is caused by the obstacles one generation throws in the way of another. What inconvenience, disadvantage, and expenditure, has not London suffered from the mode of restoration pursued after the Fire of 1666? The great opportunity then presented was lost. Wren's plan, based upon public considerations, was put aside, and the renovation of the city became a petrification of private interests. The habits and demands of an earlier and meagre population were repeated, when the expansion suited to augmenting intercourse should have been secured. The error arose from looking backwards instead of forwards, regarding the past without estimating the future, recollecting the London of old rather than perceiving the present and forecasting her coming necessities. Financial science was ill understood, there were no Compensation Acts, no obligatory sales. But now all is changed, and we debit posterity with a due share of costly permanent works. Yet in the face of this, at a moment when a more general, extensive, and rapid, rebuilding of London than ever took place before is in progress, some of the old failings are likely to be renewed. A special instance is threatened at Charing-Cross by the refusal of the Metropolitan Board of Works to include in the plan now in course of preparation provision for a bridge in that locality. Going back to an early date in our pontine history, when princes and the pontifex maximus set their houses together better than of late, we find an ex-sea king named Olave, or Tooley, settled at Southwark. In the year 1008, the hostile Danes had got possession of London Bridge, when Olave tore down the structure by the force of his rowers, and the good service thus rendered to his Saxon majesty, Ethelred the Unready, had, no doubt, its effect *inter alia*, towards the canonisation that has kept the name of Olave in remembrance at Southwark ever since. But it is more to the purpose to know that the bridge was wide enough to allow two carriages, "if they met upon it," to pass each other. The carriages then in vogue, such as the horse-litter and pannier, were not nearly so trying as the drays, vans, steam-rollers, and traction engines of the present day; but taken for what they were, and remote as the chance of a meeting may have looked, a degree of foresight was displayed that is certainly worthy of modern imitation; for not only are recent bridges too narrow in some instances, but injudiciously placed in others. One, at least, would have been raised elsewhere, had not its approaches been galvanised a century and a half ago. The Metropolitan Board of Works is not commonly satisfied with an imperfect accomplishment of purposes once made its own. The embankment of the Thames is its creation, and the promotion of its utility a purpose still more tedious and difficult, involving the formation of new lines of access, and subordinately the extinction of bridge tolls. These objects will occasion the remodelling of a large tract at Charing Cross, and it will be matter for regret if a plan for the general treatment of the contiguous space be not devised and maturely considered, before any expensive erection be set about, such as one already ordered by the Commissioners of Police. The Institute of Architects is to have some oversight of the designs for edifices on the site of Northumberland House, but a voice on the plan would be of more public value. The same adaptation to the probable wants of the next few centuries ought to obtain here that may be discerned between the Horse Guards and Great George-street. As a town embellishment, the Embankment has high and peculiar claims, but a way on the edge of a river, and therefore capable of receiving tributaries on one side only, is at some disadvantage as an artery of general communication. Carriages may freely meet and pass each other on its ample surface, but as a thoroughfare of simple utility, it must depend upon the extent to which its sections can be incorporated with leading routes. The Albert, or Lambeth, line, has been fairly adopted, for the obvious reason that it materially shortens the way from Nine Elms to the City. The Victoria Embankment, though on the more populous side, is at present less developed.

The formation of the avenue at Charing-cross

will give it a vast accession of usefulness, as the most direct way between two great focal points—the Nelson Column being to the west, as the Mansion House to the east—the cynosure of cab and 'bus. The gardens, the District Railway, and the river, will help to render this part of the work most attractive and beautiful. As to the bridge enfranchisement scheme, there are more ways than one of effecting the object. "The coal and wine duties" are usually coupled in a perfunctory way as things of the same species, but their characters are very distinct. Time was when a coal fire was more uncommon in London than a butt of sherry; but coal has degenerated into a necessity of the meanest house, while the other retains its old position, and a reasonable ground is presented for economic discrimination. Bridge tolls have not the same pressure as they would if Southwark, Blackfriars, and Westminster were not free. They are already moderated, and would, no doubt, be voluntarily relinquished at the end of a few years, in consideration of a small immediate augmentation. They would thus fall imperceptibly into public possession; and the feeling of exultation would, in some instances, be tempered by the cost of maintenance. If the enfranchisement, in short, of Waterloo, Lambeth, Chelsea, the Albert and Battersea bridges, together with the inaccessible footways at Hungerford, is to be obtained by galvanising things as they are for ages to come, it does but exemplify the axiom "Gold may be bought too dear." A more advantageous outlay would be found in a new bridge from Trafalgar-square to Lambeth, seeing that no public vehicle traverses Westminster or Waterloo (saving always the sort of ferry-bus over the latter) without taking Charing-cross enroute. The plan here contemplated presents, it can hardly be necessary to assert, many elements of novelty and grandeur calculated to assist the unexampled effect that ought to crown these great undertakings.

T. M.

### PIPES FROM BASINS, ETC.

SIR,—I can endorse the remarks of W. P. Buchan on this subject, and although he defends the ignorance of plumbers from the "cupidity or selfishness" of employers and the carelessness of architects in plumbing details, he yet takes a view of the matter which the ordinary plumber does not, and which nine-tenths of the plumbing fraternity would, a few years ago, have laughed at.

Mr. Buchan proposes a well locked siphon-trap and a properly put-in waste-pipe, but he takes care to add, "In certain cases all chance of danger from sewer gas could easily be avoided by either discharging the waste-pipe itself above the ground outside, or causing it to discharge above the surface of the water in a fireclay siphon-trap sunk in ground and open at top with an open grating over it." Now this latter part of the suggestion is all that is required, and the plan was suggested years ago by myself among others, but at that time was pooh-poohed. Even now it slowly takes root among the traditional methods of the plumbing craft, and unless vigorously insisted upon by architects or sanitary surveyors, will, probably, be choked among the luxuriant tares of professional indolence and custom.—I am Sir, &c.

G. H. G.

### THE ORDNANCE MAPS.

SIR,—One of the sheets of the Ordnance Map, delineating the western suburbs of London, is lately published, and at the foot is the following inscription:—"Surveyed in 1866, engraved in 1872, and published 30th June, 1874."

Now this speaks for itself, and not very creditably. Why should it take eight years after surveying a district before the plans reach the public? In eight years a whole neighbourhood is often much changed, and consequently maps are out of date before they are published in this dilatory manner. Nor is the above a solitary instance by any means—it applies to most of the sheets. Fancy publishing a map in 1870 of the City as it was in 1862, or of Queen Victoria-street in 1875 as it might have existed in 1867!—We are, Sir, &c.,

SURVEYORS.

### NEW STABLES AT LAMPITS.

SIR,—Referring to Mr. Duffield's critical remarks on these stables, the week before last, allow me to offer the following explanation. The central opening in the stable is not a window, but a doorway, bricked up with a straight joint. The two flues are from the washing-room fireplace and the heating apparatus below. What Mr. Duffield imagines to be ledges on the outside of the doors are simply the wrought iron strap hinges. The carriage-house gates are 7ft. 3in. wide. The harness-room is lighted by windows placed immediately below



the ceiling, in order to obtain light over the ridge of the adjoining vinery. The washing-room is supplied with soft water by means of a pump placed in the recess, which raises the water from the outside tank. Mr. Duffield's remarks on the omission of loose-box doors, racks, &c., I think I need scarcely answer.—I am, Sir, &c.  
E. BURGESS.

15, Great James-street, W.C., Nov. 4, 1874.

#### CURVED LINES IN ARCHITECTURE.

SIR,—I frankly admit that in using the words "ellipse" and "oval" in the loose manner I did, at p. 534, I left myself quite open to the criticism given by Mr. Hugh H. Stannus, at p. 564. I am not sorry for that, however, merely wishing to state a fact and to bring out, perhaps, further information upon the subject. I therefore beg to thank Mr. Stannus for his remarks.—I am, Sir, &c.

Glasgow, Nov. 7th.

W. P. BUCHAN.

## Intercommunication.

### QUESTIONS.

[3541].—**Squints in Arcades.**—At Tysoe Church, Warwickshire, and at Kingsthorpe Church, Northampton, between the arches of nave arcades, and just above the caps, are openings looking into the aisles, they are about 3 or 4 in. wide, and 12 or 16 in. high, and on the nave side they are played widely in an upward direction, and to one side. The arcades in both instances are Norman. I should be glad if some one would explain their use. I have heard that they were used as windows before glass was much used, but the aisle roofs would cover them in each case, without the roofs were trimmed for them.—E. P.

[3542].—**Gas Stoves for Drawing-Room.**—Can any one recommend the above, and state the cost of fixing and arranging? One that would look like coal-fire desired.—M. L. M.

[3543].—**Granite.**—Would granite, red or gray, be a less costly material for building purposes in any part of Scotland than the best quality coloured bricks? If so, where?—M. L. M.

[3544].—**Tar Pavement.**—Will some of your readers kindly inform me how to make a good durable tar pavement, giving the kind of materials, proportions, and treatment?—C.

[3545].—**Ownership of Architect's Plans.**—If the client claims them, is he bound to give them up, and if so, charge the client for copies retained for his own use?—S. T.

[3546].—**Preserving Wood and Rendering it Uninflammable.**—About the beginning of August last a report of experiments of a new process, invented by the Rev. Dr. Jones, for preserving wood and rendering it uninflammable, appeared in the *Daily News*. Can any one inform me as to the superiority of the new process of creosoting, or give me the address of Dr. Jones?—JOHN FAIRWEATHER.

[3547].—**Watertight Floors.**—I have a ploughed and tongued floor, and whether the tongues are not perfect, or there have been none put in, I cannot say, but I wish to make it watertight so that rain may not pass through to the passage under. Can any correspondent give me a remedy for this?—O. P. Q.

### REPLIES.

[3477].—**Zinc Roofs.**—"G. H. G.'s" method is not the best. "A. B." should read Mr. Buchan's articles on Plumbing in a late vol. of *BUILDING NEWS*, or write to Mr. Edmeston or Mr. Fisher, the London architects of the Vieille Montagne Zinc Company, for the illustrated circular of that company, showing the method recommended by them.—L.

[3523].—**Extras and Deductions.**—Your last week's correspondent, "G. H. G.," who is an architect, gives his opinion from an architect's point of view. As a builder, I should like to give my opinion. "G. H. G." says "so much depends upon the wording of the contract that it would hardly be safe to venture an opinion." If by this he means that the legal element is not strong enough to bind the builder entirely to an architect's or client's view, then perhaps he is right. My own opinion is, the nature of the agreement is at fault, and the root of all the mischief, and all parties thereto deserve all they may be called upon to suffer for entering into such an arrangement. In this case quantities are supplied, I presume, by the architect. The builder's tender is a calculation based upon these quantities and items in the schedule. Now, from what follows, I suspect the architect did not feel quite easy about their correctness, and therefore prevails upon the builder to take the risk of blunders not his own, and in executing the work he finds the quantities sadly deficient, and, notwithstanding his contract, thinks it reasonable to get back his own by fair and unfair means. Surely, if a respectable builder had been supplied with quantities fairly and honestly taken out, intending to represent the work proposed to be done, and a provision if more or less to be added or deducted,

as the case might be, how could he cavil about any of the items named by "F."? It is quite clear all items under Nos. 2, 3, 4, 5 would have been decided by the items in quantities given. As to item No. 1, in amounts available for disbursement; such sums the proprietor or his agent has every right to use at his discretion. Item No. 6 seems to me to come out of sharp practice. If the architect saw such alterations suggested by the builder would entail more cost, he consents because he sees his client's advantage, for I think he would not agree to alterations to save the builder's money. The builder, on the other hand, sees an extra, of course; but the architect having consented, he makes his claim afterwards, and it may be very exorbitant. Here, again, prices in the schedule would decide what is a fair claim under contract. I do hope this vexed question of quantities supplied will be freely ventilated. If they were guaranteed as correct, there would be no such disputes as "F." details.—J. H. I.

[3530].—**Hydraulics.**—"G. H. G.'s" reply is evidently defective, misleading, and contrary to all scientific teaching. The friction and other retarding causes adduced by him would not prevent the rise of the water to the same level as the head. The friction would simply lessen the quantity of water passing through in a given time. Mr. W. P. Buchan's reply is probably the correct solution.—L.

[3530].—**Hydraulics.**—The cause of the water not flowing into the lower cistern is the resistance or friction of the pipe. Let us suppose the same length of pipe to be straight, with a fall of 5 ft. and head of 1 ft., making altogether a head of 6 ft. The velocity of the flow would be about 6 ft. per second; there would, however, be a loss of head arising from the resistance of the pipe amounting to 5 ft., so that the water at its exit would not rise more than 3 in. above the orifice. If the diameter of the pipe was doubled, the loss of head would be reduced one-half.—E. W. T.

[3532].—**Cable Length.**—My tables, "MacKenzie's," give 6 ft. or 2 yd., equal 1 fathom; 120 fathoms equal 1 cable's length; therefore 720 ft. to 1 cable length. Perhaps "H. S." has misread Hurst, but I can find no reference to the subject in his handbook.—L.

[3533].—**Architect's Charges.**—I think that "X. X. X." would be entitled to make two separate charges as he suggests. 5 per cent. for superintending such work is only a reasonable amount. The Institute paper recommends a charge of 5 per cent. for surveying and estimating dilapidations.—L.

[3533].—**Architect's Charges.**—"X. X. X." may make distinct charges for the survey and estimate, and for the superintendence of the repairs to the property in question, though whether he be justified in charging five per cent. for the latter work must depend on the kind and amount of work done. For a small outlay, I think the charge not too much; but for work amounting to say two or three hundred pounds I should be inclined to reduce the percentage, as I presume no plans but merely specification of work was necessary. The five per cent. includes designs, all necessary drawings as well as superintendence, and this was hardly entailed in the work mentioned.—G. H. G.

[3535].—**Fireproof Warehouse.**—Placing the main girders at 10 ft. apart, they should be 18 in. deep, with 4 in. flanges; the rolled iron joists should be 4 in. The section of girders I should suggest would be two simple double-flanged ones, bolted together and known as Phillips's patent.—G.

[3537].—**Shutters.**—Folding shutters are certainly open to objection. They require large boxings, and are subject to drop if the openings are wide. Plate glass in ordinary cases is a sufficient protection, but in some cases I think sliding outside shutters of the Venetian kind answer all the purposes of protection. They may be made to slide in internal hollows and then they are in every respect efficient both as blinds and as a protection. I do not see why inside sliding shutters should not be often employed.—G. H. G.

[3538].—**Contracts.**—"Moffett Little" should read "Redman's Law of Arbitrations," Jenkins's and Raymond's "Legal Handbook for Architects," and Glen's "Law of Contracts" to obtain clear and comprehensive ideas of the positions of arbitrators under the widely different circumstances under which they are appointed. I suppose that it has not occurred to him that an arbitrator's award need not always be in writing, yet so it is.—L.

[3538].—**Contracts.**—In reply to your correspondent Mr. Moffett Little, I may say that an architect or any other arbitrator, however appointed, is, in the first instance, to be governed by the special terms of the document by which he is appointed. Allowance being made for such differences as are thereby created arbitrators are all governed by the same laws, whether appointed by a judge or by contract agreement, i.e., by mutual consent. Unless the contract expressly stipulated that his decision on any disputed point should be in writing, even a verbal statement would be perfectly legal, but the award, if in writing, would have to be stamped to make it admissible as evidence in a court of law. Mere clerical errors will not invalidate an award. No arbitrator would, of course, be entitled to deduct from moneys due to a contractor sums for items of work which were not included in the contract, and his award would be invalid in respect of sums so deducted, but not necessarily as to the whole award.—BANISTER FLETCHER.

[3540].—**Round and Polygonal Churches.**—A list of English (and foreign) round churches will be found in my *Sacred Archaeology*, p. 518. (Lovell, Reeve, and Co.)—MACKENZIE E. C. WILCOTT.

### STATUES, MEMORIALS, &c.

**COATBRIDGE.**—A fountain is about to be erected at Coatbridge, near Edinburgh, as a memorial to Mr. E. Whitlaw, M.P. It has been designed by Mr. Hugh H. McClure, architect, Glasgow, and is to be built of fine Aberdeen and Peterhead granite. The pedestal will rise to a height of 12 ft. above the level of the street. Over it rises an arched canopy, which will be supported on four red granite columns, and above this will stand an octagon plinth, or pedestal, which will carry a pear-shaped dome. The whole erection will be about 38 ft. in height.

**INVERARY.**—A bust of the late Lord Colonsay has been placed in the Court-house, Inverary. Mr. John Steel, of Edinburgh, is the sculptor. The bust, which is in white marble, stands on a pedestal of polished Peterhead granite.

**LICHFIELD.**—A life-sized figure of St. Chad has been placed in a niche in the west gable of St. Chad's Church, Lichfield. The figure, which is the gift and design of Sir Gilbert Scott, by whom the restoration of the church is being carried out, is wrought in a reddish-coloured stone, and weighs 18 cwts. St. Chad is represented habited in pontifical robes, holding in his right hand his pastoral crook, and in his left hand a model of the first cathedral built at Lichfield. The sculptors were Messrs. Farmer and Brindley.

**THE HOME OFFICE.**—On Tuesday, at the new Home Office buildings, the statues of Lord Greville, Lord Russell, Lord Liverpool, Lord Melbourne, Sir Robert Peel, Sir James Graham, Sir G. Cornewall Lewis, and Sir George Grey, were placed in position.

### WATER SUPPLY AND SANITARY MATTERS.

**KURRACHEE.**—A new scheme for supplying the Kurrachee (E.I.) municipality and the district with water is about to be executed under the direction of Mr. James Strachan, C.E., the municipal secretary, at a cost of 13,83,354/56 rupees. A supply of 100 gals. of water per dlem per head is expected, to 60,000 inhabitants.

**THE DRAINAGE OF THE THAMES VALLEY.**—The Local Government Board, writing to the Surbiton Improvement Commissioners, say they are fully sensible of the difficulties under which the sanitary authorities in the Thames Valley are labouring in relation to the disposal of their sewage, and for some time past they have been giving their attention to the subject, and more especially with respect to a suggestion which has been made for the formation of a united district, for the purpose of adopting a scheme which shall be adequate to the requirements of the whole locality of which the district of the Commissioners forms part, and they are now awaiting an application from one of the sanitary authorities concerned, in order to enable them to institute an inquiry under Section 26 of the Public Health Act, 1872. This letter was read to the Commissioners at their meeting on Monday night, and a memorial was prepared requesting the Local Government Board to institute an inquiry "for the purpose of ascertaining the best method of draining the district of Surbiton, and generally that portion of the Thames Valley which is above the Metropolitan area."

**THETFORD.**—The Thetford Urban Sanitary Authority have agreed to purchase land for the erection of new waterworks.

### LEGAL INTELLIGENCE.

**FALL OF A PARTY WALL.**—LAMBERT v. MADGESON. This was an action in the Rolls Court, on Monday before the Master, by one neighbour against another for causing the fall of the party-wall between their houses. It was admitted that upon the deeds the plaintiff had a right to the support of the wall; but it was contended that he had materially weakened his part of the wall by turning the lower part of it into a shop, and making it one large window, thus weakening the strength of the wall, and, in fact, cutting away almost all the lower part of it. The defendant had made excavations, and thus had caused the wall to fall down. At the trial at the Assizes at Liverpool the case for the plaintiff was that the defendant had excavated carelessly, and he recovered a verdict for £60, and the question was whether it should stand. It was impeached upon the ground that the burden of the wall had been increased by the alterations made by the plaintiff in his premises, and that the defendant's excavations did not come within 3 ft. of the wall, so that it was the weakness of the plaintiff's house and not the excavations which caused its fall. It appeared, however, that this point was not taken at the trial, and now it was attempted to raise it on an application for a new trial. The Court, however, thought that as the point had not been raised at the trial it could not be received here, and, therefore, judgment was given for the plaintiff.

**THE EPPING FOREST INCLOSURES.**—The arguments were concluded on Tuesday afternoon in the Rolls Court in the case of the Commissioners of Sewers



for the City of London v. Glasse and others. One of the objects of the suit was to obtain a declaration from the Court that the plaintiffs, and other owners and occupiers of lands and tenements in Epping Forest, have a right, under certain regulations, to turn cattle which are commonable within the forest—i.e., horses and neat cattle—on to any part of the great waste of the forest. The bill also asked for an injunction to set aside inclosures which have been made in the forest during the last twenty years by lords having manorial rights within the forest, and to prevent any inclosures therein for the future. The Master of the Rolls held that the plaintiffs had established their case, and a decree would be granted accordingly. With reference to the mandatory injunction asked for, the case would be put again in the paper in a week, in order that one counsel on each side might address the Court as to the extent of such injunction. As to the costs of the suit they must be paid by the defendants, with the exception of Mr. Humphreys, who disclaimed.

#### LAND AND BUILDING SOCIETIES.

**BRISTOL PERMANENT BUILDING SOCIETY.**—On Friday week this society held its twenty-fourth annual meeting at the Bristol Athenaeum, Mr. John Lucas being in the chair. The audited accounts, which the meeting adopted, showed that the society had during the year ending the 31st July last advanced £26,480. to the members on mortgages on houses and land, and had out of the year's profits borne legal and other costs, in connection with these mortgages to the extent of nearly £500.

**PLANET BUILDING SOCIETY.**—The twenty-sixth annual meeting of this society was held last week. The report stated that during the financial year ending 5th August, the amount received from sales actually completed was £78,972. 16s. 5d., and at the above-mentioned date contracts had been entered into for further sales to the extent of £30,347. The vice-chairman, in seconding the adoption of the report, said that for nineteen years the society had been prosperous, and paying well-earned dividends. All their calamities were of the last five or six years, and arose from making enormous loans to builders—a class of business that should never have been entered into. It was never intended that building societies should exist for the benefit of share speculators and borrowing builders, but for the benefit of respectable tradesmen and the better class of working-men.

**WEDNESBURY BENEFIT BUILDING SOCIETY.**—The annual meeting of this society was held on the 27th ult. The report gives the number of shares realised as 33½; the number of shares withdrawn, 81½; the number of mortgage shares redeemed, 25; the number of new shares taken up 236½; the total net profits for the year, £1,361. 7s. 8d. The committee expect that next year's bonus "will be larger than any of the immediate preceding ones."

#### CHIPS.

A new Methodist chapel was opened at Chew Magna, near Bristol, on Tuesday week. It is built of local stone, with Dundry stone dressings. Sitings are provided for 150 worshippers. The architect is Mr. W. H. Clark, and the contractor, Mr. R. J. Crocker.

Wrighton Congregational Chapel, Bristol, was reopened on Tuesday week, after restoration, at a cost of £240.

The parish-church of Monckton Farleigh, near Bath, was reopened last week, after restoration.

The foundation-stone of St. Michael's Church, Chester-square, was relaid on Friday last. It has been determined to take down the old church, and transepts abutting therefrom, and to build in their stead a new chancel, whilst at the same time the east end of the church will be thrown back some 20ft. Messrs. Hill, Higgs, and Hill, are the builders.

A new Primitive Methodist chapel was opened on Sunday week in Shankhill-road, Belfast. The building will seat nearly 200 persons. Its cost will be about £650. The builder is Mr. H. Keith.

St. John's Church schools, Whitby, designed by Mr. E. H. Swales, architect, and executed by Mr. W. Langdale, contractor, are now completed.

A terrible fire at Cronstadt has destroyed the homes of from 10,000 to 15,000 people. Ninesquares or blocks of houses, including the Gostinni Dwor or Bazaar, have been consumed. One church and two chapels have disappeared. The town has never yet been supplied with any system of waterworks, and it is not, therefore, extraordinary that so large a portion has been destroyed.

Mr. Thompson, late consulting engineer to the Derby Town Council, has been appointed Borough Surveyor.

The Manchester Limmer Asphalte and Concrete Co., have secured the contract for the erection of 132 concrete houses at Dundee.

New sewerage works are proposed at Chard, Somerset, at a cost of £500.

## Our Office Table.

**PAISLEY.**—THE NEW TOWN-HALL.—It would seem, says a local paper, that the Corporation of Paisley is to have numerous architects competing for the designs for the new Town-hall, the gift of the late Mr. Clark. Already nearly 200 have applied for copies of the ground-plan, and accompanying suggestions and specifications, and it is expected that this number will yet be considerably enlarged. Some of these are from a distance. The site on which the hall is to be erected is between the Abbey Close and the River Cart, and the ground contains 3,380 square yards. The building is to contain a large hall to accommodate 2,000 persons, a smaller hall to accommodate 200, and one or two committee-rooms, suitable retiring and cloak-rooms, cooking kitchen; also a reading and smoking-room to accommodate 200 persons. The large hall is to have a gallery or galleries, site for an organ, with raised dais, a platform for orchestral, theatrical, or lecturing purposes. The Corporation has declined to suggest any style of architecture, but has attached importance to excellence of arrangement. The whole expense of the building is not to exceed £18,000. A letter has been received from the Association of Architects in London suggesting the appointment of an architect, who is not competing, as assessor to the committee which is to decide on the designs, and also that any architect who lodges a design, the estimate of which extends 10 per cent. of the sum to be expended, should be excluded. It is likely these suggestions will be adopted, and also that the time for sending in the designs will be extended beyond the 1st February.

**VALUE OF EMPTY HOUSES FOR ADVERTISING PURPOSES.**—The St. Pancras Vestry is alarmed at the rapidly increasing number of unsightly hoardings in the public thoroughfares of that and other parishes. One of these hoardings having been placed against the railings of the side of Euston-square which faces the entrance to the Euston Railway Station and the Stephenson statue, the Highways, Sewers, and Works Committee took legal advice as to their power to pull down the hoarding, and were informed that "as the hoarding for advertising purposes is erected on the ground next to but not forming part of the footway, the Vestry has no power to prevent its erection, or its subsequent use." The Rating Committee of the Vestry are now engaged in bringing into assessment these hoardings, as it appears that houses are purposely kept empty to be used as advertising stations, for which a higher rent is obtained than if they were occupied. It is stated that for a beerhouse in Great College-street, which formerly let at £60 a year, but which is shut up, and has its front and two sides covered with advertising boards, £3 a week is now paid. For the hoarding against the railings of Euston-square the contractor stated that £2 a week was the rent paid.

**THE METROPOLITAN BOARD OF WORKS AND DWELLINGS FOR THE POOR.**—Mr. Freeman will move, at the meeting of the Metropolitan Board of Works to-day (Friday): "That this Board agrees with the opinions expressed by the Chairman [Col. Sir J. M. Hogg] in the House of Commons on the 8th of May—(1) That it is urgently desirable that the dwellings of the poor should be improved. (2) That this Board will willingly co-operate with the Government in carrying out any wise measures for effecting the same."

**IMPROVED PLASTER CASTS.**—A discovery of some interest has recently been made by a Frenchman who combines the professions of chemistry and modelling. Hitherto a great objection to reproductions of sculptured works has lain in the quality of the material used for the copy. The texture, the colour, and the perishable nature of plaster, render it little fitted for the purposes of decorative art work. Its crude white surface is but a poor imitation of marble, while its assimilation to bronze has not been hitherto possible. In the Exposition de l'Union Centrale at Paris there are plaster casts which differ altogether from the work commonly ranged under this title. M. Caussinus, the inventor, has discovered a means of imitating exactly the texture of either marble or bronze, and the process by which this imitation is effected serves also to give strength and durability to the plaster. The surface of the

cast is first carefully prepared, and is then covered with successive coatings of a chemical solution oxydised by the action of sulphur, and receives finally the colour of the object to be imitated. According to a writer in the *Constitutionnel*, the effect sufficiently resembles marble or bronze to deceive connoisseurs, and its durability has been carefully tested.

**MUNICIPAL BOROUGHES.**—The Local Government Board has received financial returns from 223 municipal boroughs in England and Wales; the number would be 225, but the City of London is not bound to send a return, and Stoke-upon-Trent has been too recently incorporated to be included in the present return. The receipts of the 223 boroughs in the year ending the 31st of August, 1873, amounted to £3,436,824, and their expenditure to £3,742,563; and the aggregate amount of the loans to them, outstanding at the close of the twelvemonth, was £6,613,095. The chief receipts were £858,638 from borough rates under the Corporations Act of 1835; £445,759 from other rates; £197,088 from tolls and dues; £439,279 from rents and fines on the renewal of leases; £168,348, Her Majesty's Treasury subventions for police, prosecutions, and maintenance of prisoners. The expenditure in the year included £1,412,629 on public works, £582,868 on police, and £179,495 on prosecutions and maintenance of prisoners, £116,997 contributions to School Boards, £224,589 salaries and poundage. After deducting the allowance from the Treasury the expenditure from the borough resources on the prosecution and maintenance of prisoners was but £127,252; on the police it was £466,763. The rateable value of the 223 boroughs in the year 1872-73 amounted to £23,522,518. There are 19 municipal boroughs in England (besides the City of London) of rateable value exceeding a quarter of a million sterling. First stands Liverpool with a rateable value of £2,768,739; then Manchester, £1,805,128, and Salford, £550,030; Birmingham, £1,229,844; Leeds, £807,886; Bristol, £719,237; Sheffield, £690,804; Newcastle-upon-Tyne, £506,958; Bradford, £580,689; Brighton, £418,522; Hull, £402,858; Oldham, £353,787; Portsmouth, £313,973; Nottingham, £311,525; Leicester, £302,676; Bolton, £285,668; Sunderland, £276,500; Rochdale, £269,204; Bath, £253,021.

**THE SAW PREMIUM AT THE CINCINNATI EXHIBITION.**—The prizes offered for the best circular saw at the Cincinnati fair, 100 dols. in gold, has been awarded to Messrs. Emerson, Ford, and Co., of Beaver Falls, Pa. There were nine contestants, and the work done by each saw was remarkable for excellence and rapidity. A Cincinnati paper says that Messrs. Emerson and Co.'s solid tooth saw, "when it struck the test log, showed its real metal. It took in the situation most beautifully, making the sparks fly gaily at every entrance into the tough poplar, but was steady and kept right down to actual work all the time, making sixteen good boards, 10 x 20, in 2min. and 44sec., on 3½in. feed, and coming out cool as a cucumber. The oak log was then placed upon the carriage, and the saw proved that its appetite had merely been sharpened by the poplar. It cut twelve oak boards, 12 x 15, in 1min. 43sec., all No. 1 lumber. This is the crowning feat of the test so far." Messrs. Emerson, Ford, and Co. were also awarded the silver medal for the best saw exhibited.

**PNEUMATIC GAS.**—A successful trial of a new pneumatic gas has been made in Scotland. On a recent occasion the works of Messrs. Hally and Co., manufacturers, at Ruthven Vale, Auncerarder, were lighted with this new gas. The lights, which numbered considerably over 200, had a fine effect. Each light is equal to 20½ candles, and is free from odour while burning. The gas is made from gasoline, a spirit extracted from petroleum, and other substances. From three to four gallons of gasoline will make 1,000 cubic feet of gas. The cost ranges from 1s. 3d. to 1s. 6d. per gallon, so that the gas can be produced at from 5s. to 6s. per 1,000ft. The carburetter, in which the gas is generated, is sunk in the ground to the depth of about 6ft., and at a considerable distance from the works, to insure safety. The cost of erecting the works for producing the gas will be about £260. The cost of gas supplied by the present Gas Company is 9s. 7d. per 1,000ft. The new gas is said to be quite equal to that supplied to Liverpool and Manchester, and considerably above the illuminating power of the gas in London, Birmingham, and other large towns in England.



**THE BODLEIAN LIBRARY, OXFORD.**—Great interest attaches to the question now under consideration at Oxford as to the improvement or removal of the well-known library of the University of Oxford. The increase of the University has necessitated additional space for its operations, and the numerous books which, in accordance with Act of Parliament, find their way to the library have become a serious charge. The authorities have long felt the necessity of providing more ample premises for the public examinations and professional lectures. At present the "Schools" and the Bodleian share the same block of buildings, and it becomes a question which is to seek fresh quarters. A committee of prominent members of the University has been appointed to consider the subject, and Sir Gilbert Scott and Captain Douglas Galton, C.B., have been consulted. What Sir Gilbert Scott recommends we have not heard, but Captain Galton, in a report issued on the 20th ult., discusses at some length the probability of fire at the existing building, and the best means of protection, but he seems to favour the idea of the removal of the library to a site forming part of the present Botanic Gardens. Several sites have, however, been suggested. On the other hand, there is a strong feeling evinced against the removal of the library. Mr. Cox, the librarian, considers that by removing the library "from its present site, Convocation would be destroying one of the most beautiful and interesting specimens, and they would be jeopardising the usefulness of what has always been one of the most accessible, and, therefore, one of the most popular libraries in Europe."

**MAYENCE CATHEDRAL.**—Since (says the *Pall Mall Gazette*) we noticed some time ago, the advance made in the restoration of Mayence Cathedral, and the remarkable interest excited in Germany by the archaeological discoveries the work has produced, a fresh account has been published of the further progress, written in the same careful and reverential yet without thoroughly antiquarian spirit as the report of the architect then quoted from, but in the form of a pamphlet, by Prebendary Schneider, a member of the chapter. This concerns chiefly the exploration lately made of the crypts under the choir, and tells their history, as now revealed for the first time, with great clearness. The main crypt, which has been cleared of the rubbish with which it was entirely choked up, proves not to be of the eleventh century, as was currently believed, but to a period of pure and simple Gothic, certainly not earlier than the second half of the twelfth; and there is little question but that this fine piece of work formed part of the vast structure undertaken by Conrad of Wittelsbach, the real founder of the Mediaeval dome. The crypt, known from records to have been built by Bardo about 1036, remains of which have in vain been sought for, must have perished completely in the repeated destruction of the church above, which shared the stormy fortunes of the city in the eleventh and first part of the twelfth centuries. The subsequent history of the Wittelsbach crypt has been made clear as the excavations went on. It was evidently threatening to sink in under the weight of the great tower added over it in the fourteenth century; and its beauty was therefore sacrificed to the necessity of filling up the intervening spaces between the arches with stray pillars added to support the increased weight above. Thus wholly spoilt for use or show, it was parcelled out into tombs, mainly for the successive archbishops, who were buried here in state, and often with so much of their ornaments about them that the prebendary states that a thorough examination of the tombs furnishes complete materials for a history of ecclesiastical decorative art from the fourteenth century down to recent days. The very beautiful specimen which the crypt afforded of a subterranean church is now being cleared and restored carefully, as far as the superincumbent weight allows the work to be done with safety.

The question of harbour improvement is being discussed at Lyme Regis. Mr. Ward Jackson, the chairman of the Railway Company, has furnished to the Town Council a plan for extending the Cobb, which it is proposed to make large enough to admit almost any amount of small craft, the contemplated area being 75 acres, formed by a breakwater extending from the north-eastern shore and running southward about 1,000ft., with an entrance 300ft. wide.

## CHIPS.

New waggon works at West Hartlepool have just been opened. Messrs. Johnson and Fletcher have been the contractors, and the machinery is chiefly from Messrs. T. Robinson and Son, of Rochdale. Messrs. Robinson have also supplied the machinery for a large sawmill, erected in Stockton-street, West Hartlepool.

A commencement was last week made with the large new engine stable in Mainsforth-terrace, West Hartlepool, for the North-Eastern Railway Company. The cost will be £10,000.

The foundation-stone of a new Congregational chapel was laid at Silverdale, North Staffordshire, on Monday week. The building will be a plain Gothic structure, having a porch and tower. It will seat about 400 people, and the cost is estimated at £1,500. The architect is Mr. W. L. Sugden, of Leek, and the builder, Mr. Bennett, of Burslem.

The death is announced on Friday last of Mr. W. Smellie Watson, a well-known member of the Royal Scottish Academy, and one of the few survivors of the band of artists who originally formed that incorporation. Mr. Watson had attained his seventy-seventh year.

On Sunday night a fire broke out in the Free Church, Regent-street, Portobello, Edinburgh, which resulted in the almost total destruction of the building, a fair specimen of modern church architecture, erected about the year 1825.

The first sod of the ground upon which the new Church of St. Andrew is to be erected in Black-lane, Radcliffe, near Manchester, was cut on Saturday. The church is to accommodate 500 worshippers, and is to be built from the designs of Mr. Lowe, architect, Manchester, by Mr. Napier, also of Manchester. The cost will be about £5,000.

We regret to announce the death of Mr. Woodcock, for many years the efficient manager of the London Warming and Ventilating Company.

The foundation-stone of a new Established church was laid at New Monkland N.B., on Monday. Mr. Watt, of Glasgow, is the architect.

The project of a tunnel under the Straits of Dover will be brought before the French Assembly within a few days after its meeting.

The tender of Mr. John Hands, builder, of Weston-super-Mare, for the erection of the third portion of the West of England Sanatorium in that town, has been accepted, and the works will be commenced forthwith.

The new church at Denbigh was opened on Sunday, in the teeth of the Bishop's refusal to consecrate the building on account of the alleged Ritualistic tendencies of the reredos. This step has been taken under the Act 18 and 19 Vict., which empowers a rector to hold service in "any building" in his parish.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHELVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB AND SON,  
Makers to the Bank of England,  
57, S. Paul's Church-yard, E.C.  
And 68, S. James's street, S.W.—[ADVT.] } London.

## MEETINGS FOR THE ENSUING WEEK.

**MONDAY.**—ROYAL INSTITUTE OF BRITISH ARCHITECTS.—On "The Orwell Park Observatory." By Mr. J. M. Anderson, Fellow. (Mr. Airy, C.E., will explain the scientific portion of the work.) 8 p.m.

**TUESDAY.**—INSTITUTION OF CIVIL ENGINEERS.—Discussion on "the Nagpur Waterworks, and on Rain-fall, Flow from the Ground, and Evaporation." 8 p.m.

**WEDNESDAY.**—SOCIETY OF ARTS.—Opening meeting of the Session. Address by Major-general F. Eardley Wilmot. 8 p.m.

**FRIDAY.**—ARCHITECTURAL ASSOCIATION.—On "Architecture and Landscape." By Mr. H. H. Statham, Jan. 7.30 p.m.

## Trade News.

## WAGES MOVEMENT.

**ARBROATH.**—The joiners of Arbroath, at a meeting held on Monday night, resolved to memorialise their employers for an increase of 3d. per hour, as from 1st March next, on the ground that their wages are below those paid in other places.

**THE SLATE QUARRYMEN'S STRIKE.**—Mr. Francis, the chief manager of Lord Penrhyn's Carnarvonshire slate quarries, and several sub-agents, having resigned their appointments, the men on strike, at a mass meeting on Saturday afternoon, resolved to resume work on Monday last.

## The Timber Trade.

Wholesale prices of timber, deals, &c. :—

	Per load.	s. d.		s. d.	
		s.	d.	s.	d.
St. John's birch		85	0	110	0
" small		70	0	80	0
Teak		220	0	280	0
Riga		80	0	85	0
Stettin		60	0	70	0
Swedish		60	0	65	0
" balks		40	0	55	0
Baltic crown fir		90	0	110	0
" best middling		80	0	100	0
" common		70	0	80	0
" undersized		55	0	65	0
Memel crown oak		110	0	160	0
" brack		105	0		
Dantzlg crown oak		110	0	160	0
" brack		100	0	120	0
Quebec large yellow pine		90	0	130	0
" waney board		110	0	130	0
" small		80	0	90	0
" oak		160	0	180	0
American rock elm		150	0	160	0
" ash		140	0	160	0
Pitch pine		75	0	85	0
Per ton.					
Bahama satinwood		7	0	8	0
Bahia rosewood		12	0	18	0
Rio		14	0	20	0
Per superficial foot.					
Cuba cedar		0	4½	0	5
Honduras cedar		0	3½	0	4½
Australian		0	3½	0	4½
Pencil		0	2	0	3½
Italian walnut		0	4½	0	5
Black Sea		0	3½	0	4½
Canadian		0	3	0	4
Bird's-eye maple		0	5	0	7
Honduras mahogany, cargo avge.		0	4	0	5
Mexican		0	5	0	6
Tabasco		0	5	0	6
Cuba		0	7	0	10
St. Domingo		0	7	0	10
" curls		1	0	2	0
Per square of lin.					
Best yellow flooring		14	0	17	6
" white		13	6	14	6
Per 18ft. cube.					
Riga crown wainscot		120	0	135	0
" brack		95	0	100	0
Memel crown		95	0	110	0
" brack		75	0	85	0
Per cubic fathom.					
Petersburg lathwood		10	0	11	0
Riga		8	0	9	0
Per mille of pipe.					
Memel crown staves		250	0	270	0
" brack		220	0	230	0
Canadian std. pipe		80	0	85	0
Per 120 12ft. 1½ by 11.					
Quebec 1st floated pine		20	0	23	0
" 2nd "		15	0	15	10
" 3rd "		12	10	13	0
" 1st bright pine		21	0	23	0
" 2nd "		15	0	17	0
" 3rd "		12	10	13	10
" 1st spruce		13	0	13	10
" 2nd "		10	10	11	10
" 3rd "		10	10	10	15
St. John's spruce		10	0	11	0
Archangel 1st yellow 3 by 11		15	15		
" 2nd "		13	0		
" 3rd "		12	0		
Gefle 1 & 2		4	by 10	14	0
" "		3	by 9	15	10
" 3rd "		4	by 10	12	10
" "		2	by 8	12	0
" "		3	by 11	14	0
" "		3	by 9	14	10
" "		2	by 7	12	0
" 4th yellow 4 by 11		12	5	12	10
" 2 by 9				12	10
" 1 & 2 white 3 by 9				11	0
" 3rd "				9	10
Nordmaling					
1 & 2 white 2½ by 7				8	10
Petersburg 1st yell 3 by 9				14	10
" "				14	10
" 3 by 7				14	0
" 2nd do. 3 by 11				13	0
" 3 by 9				13	0
" 2½ by 7				12	0
" 1st white 3 by 9				11	10
" 2nd "				10	10
Pensacola pitch-pine				12	10
Wyburg 1st yellow 3 by 9				13	10
Swartwick 1&2yel. 4 by 9				14	10
" 3rd "				12	10
Sundswall 1 & 2yel. 3 by 9				14	10
" 2½ by 8				13	0
" 3rd yel. 3 by 9				13	5
" 2½ by 8				11	10
" 2½ by 7				11	10



## THE BUILDING NEWS.

LONDON, FRIDAY, NOVEMBER 20, 1874.

## LONDON AND PROVINCIAL ARCHITECTS.

THERE are several relations in which the country practitioner stands to his Metropolitan rival that may be discussed. We may name the chief: his education, practice, social position, surroundings, advantages, and disadvantages. Let us take a middling-size town in making our contrast, though it will be seen the contrast would be greater were we to suppose a small one, and that between the two extremes a varying degree of difference would probably exist. Thus, in large towns, where professional antagonism and feeling are reduced by the numerical element and the existence of professional societies—where party and individual interests do not exercise so potent a sway over the individual, the professional man stands in much the same position as the metropolitan professional; at least, the divergence is not so marked as between the practitioners in a small town and the capital. In education we must admit the provincial labours under far more unfavourable conditions. The young student has not the advantages of the younger members of the profession in London; he has no societies such as the Architectural Association, no means of mutual aid which the classes of that institution afford; and presuming he has received an equal general education, his professional knowledge must in the main be picked up in the office of his master and among his fellow-pupils. On the other hand, there may be, and there are, some counter-vailing advantages in this. One of the greatest, probably, is the habit of independence which such an insulated culture affords. In all societies there is a dangerous tendency to fall into certain grooves prejudicial to self-reliance and originality. Majorities are not always in the right, and as societies are governed by them, the weaker members are generally to a considerable degree influenced by the opinions and bias of their confederates. We say the "weaker" members, because there are in all societies of individuals those who are more easily led than are capable of leading, and the *esprit* of the body is a considerable power in itself. Again, regarding office routine, the young country pupil has, there must be admitted, certain advantages. He is not so completely tied to mere office work; he frequently accompanies his master in the inspection of works in hand, and not only this, his office work is of a more general description. Though, as a rule, there are fewer works of importance, the young pupil has frequent opportunities of making himself acquainted with the practical details of his profession, especially when his master is also a surveyor, and takes out his own "quantities." For a young man beginning his pupilage, there are decided advantages to be derived in the office of a provincial architect and surveyor of good practice. We will mention a few: opportunities of inspecting works in progress; taking out quantities; land-surveying and levelling; laying out building estates; making surveys of properties; farm and country practice, etc. These are all decided gains which the ordinary pupil in London offices is deprived of, or which he may rarely be permitted to see till called by his own practice to undertake works of which he has no previous technical acquaintance. But the pupil in a London office has benefits accruing from the facilities afforded by the societies we have named, and also advantages in special architectural branches of his profession not accessible to the provincial student. As far as education is concerned, therefore, the advan-

tages and disadvantages are pretty nearly balanced, and looking at both sides of the question with our experience of London and country offices, we would recommend all students desirous of obtaining the combined advantages of both the general and special technicalities of their profession to divide their term of pupilage between country and London practice.

It has been a too prevalent notion that the London practitioner is the most expert and skilful in his profession; that between him and the provincial professor a considerable difference in education and experience exists. That this opinion is shared by the public who employ, rather than by the profession itself, we need hardly say; for as a rule the country professional has quite as decided an opinion of himself as some of his friends have of his shortcomings. This opinion may occasionally arise from egotism engendered in the limited world of architects of whom he is one. Not always, however, for his occasional conflict and contact with his London *confrères* has taught him to respect his own varied attainments and practical experience too well to be injured by contrast. But, unfortunately for him, his own confidence in his ability is not shared by those who belong to the outer world of patrons. It is difficult to shake a strong-rooted prejudice, and we all know by experience that a prophet often hath greater honour in a strange land than among his own kindred. On this account, though his ability may be undisputed, he not unnaturally protests strongly against the invasion by London architects of his immediate neighbourhood. There are some influences that strongly distinguish the provincial from the London profession. One of the most marked is a feeling of rivalry. Mr. A. and Mr. B., though practising in close quarters in a country town, are by no means on such friendly terms as could be desired. Mr. B. has a lurking suspicion about Mr. A.'s affairs; what work he has in hand, who his clients are, what has been the cause of a certain rupture with his clients, not to allude to other like propensities in human nature—the unchecked concomitants of jealousy. Another of those influences which the country professional has to endure and to fight against, unknown to his London brother, are the strong local interests which frequently run high and hamper his energies and talents; local surroundings are frequently a clog to him: his political proclivities are often in his way, and if he is not in favour of the dominant party he may as well close his doors. He need keep on friendly terms with clergy and corporation, guardians of the poor, and the county squires. The country architect is generally a Churchman or an unpronounced Dissenter; his creed, and not his professional ability, is too often his passport among a certain coterie of his patrons.

But let us enter his professional sanctum, and examine his relation with client and builder. These are not always of the most enviable kind. He stands sometimes in the position of arbitrator as well as architect. To design and superintend, and to write certificates, do not comprehend, as in London, the architect's duties. A client in the provinces, as a rule, exacts a great deal more besides. The architect must estimate his work,—a thing, by the bye, seldom done in London practice, though occasionally a very rough guess is substituted for an estimate; if the cost is too much he must subject his plans to a process of pruning or cutting down; be particularly well up in the items of specification and quantities, and able at a moment's notice to estimate the cost of an addition, or balance an extra. Under these trying circumstances, our country practitioner has found it to his advantage to get out his own quantities, or employ some one to take them out for him. In London, as our readers know, they are often taken out by a surveyor on his own account, and the architect has as little to do with them as with the contractor's tender itself. Though they

are seldom made the basis of the contract, in all respectable provincial offices they become practically the test of a contractor's duty, and are looked upon as of equal validity with the specification. We need hardly point out the advantages to the architect of being able to analyse his own bill, to put his hand on any item, and, in the final balancing of the work, to make a fair adjustment of the extras and deductions. But this is not all. It makes the architect a master of his position, which cannot possibly be the case when quantities are not made a special study, but are simply a kind of formal document, or basis of tender, thrown on the responsibility of another. The country architect's duties are, in every respect, more laborious and onerous than the London practitioner's. His five per cent. is supposed to include a great deal more than his London brother's honorarium; more frequent superintendence, more detail, greater financial skill, business, and legal acumen. But it happens that the man who works the hardest is not always the most esteemed.

From what we have said, it will be seen the country practitioner is thrown more on his own resources; he does not enjoy that interchange of opinion, and the benefit of brotherly advice, which the professional man in London, or in towns where societies exist, enjoys; he works more as an individual, is less supported by the custom, influence, and status of the profession as a body. At the same time, he is not less vigorous or less able on this account. In general knowledge of his profession he stands equal to, if not above, the metropolitan practitioner of his own age; though in specialities he may be considerably below par. This assumed deficiency in special branches becomes often a serious hindrance to him. He finds a London architect called in by his local church-building committee, perhaps to advise or select plans, perhaps—not unusual—to supply, *sub rosa*, a design to one of the busy churchwardens, or the rector, a fact which only in the course of events, comes to his knowledge; and all this, forsooth, because my rector or churchwarden desired to have the "best" and most recent *spécialité* in Gothic, after Mr. Street, or Mr. Leader-in-style So-and-So. Hence, though in practical knowledge of materials and construction, and as a surveyor, he may be considerably above the routine London architect, and can plan a villa, a bank, or a school with anyone, in the matter of Gothic or Italian detail he is less confident, and probably betrays a smattering which may provoke a jest or a smile. Let it not be imagined, however, we speak here of *all* provincial professors. Many of those practising in Birmingham, Sheffield, Leeds, Manchester, Liverpool, and a dozen other towns, have shown (if anything) a higher appreciation of that which constitutes *real* architecture than many professing to be the leaders of public taste; and instances have not been wanting in our own pages to give colour to this assertion. As far as learning and critical art knowledge is concerned, we could point to several provincial men who deservedly rank high; but it is no reproach to many others to say that provincialisms have crept into their designs; that the demand upon them in other equally important branches of professional practice has diverted their time and study; and that in the matter of "style" they are weaker, because less pronounced and precise in the mere scholasticism of architecture.

We will leave our summing up of the relative positions of these two representative factions of the profession to another article, when we hope to touch on one or two other relations which distinguish these two great conditions of architectural practice.

## ART AND ARCHÆOLOGY.

IT must, we think, be admitted that one of the characteristic features of our time is a widespread interest in Archæology. Not



that students in that department of learning have ever been wanting; it is just three centuries since the English society of Antiquaries was founded. But we all know the proverbial "Antiquary" of former days, generally regarded with good-humoured tolerance as a man possessed with a very odd infatuation, a harmless, if somewhat eccentric enthusiast. Shakspeare's "Antiquary" was

"Pleased again with toys which childhood please,  
As books of fables, graced with prints of wood,  
Or else the jingling of a rusty medal,  
Or the rare melody of some old ditty,  
That first was sung to please King Pippin's cradle."

and Burns pictures him as the collector of

"A routh of auld nick-nackets  
Busty airm caps and jinglin' jackets  
\* \* \* \* \*  
And parritch-pots, and auld saut lackets  
Afore the Flude."

The step is indeed a wide one from him, first to our eager ecclesiologists, architects, and students, and secondly, the crowd of amateurs of both sexes and all ages, who, if not really capable of original investigation of forgotten arts, obsolete manners, and obscure literature, are at least really interested in such matters, whether they appreciate the results of Jerusalem and Sinaitic explorations, Ninevite and Pompeian discoveries, and erudite descriptions of Mediæval life and its surroundings, or affect nothing more serious than the pleasant picnics of Archæological Associations, and the representation of historical pieces warranted to have been placed upon the stage, in respect of costume and scenery, with strict regard to the dress and architecture of the time, from information "carefully compiled from the most authentic sources." Surely the labours of no "antiquary" of former days ever had so wide an influence as had Pugin and Ruskin in architecture, Didron in early art, Helmore in ancient music, Neale in Mediæval hymnology, and Mrs. Jameson in the literature of sacred art. It will at once occur to us, as we speak of Mediæval antiquities, that our students do not limit their enthusiasm to the investigation of them, but that with increased knowledge came an actual revival of Mediæval architecture, painting and illumination, a reproduction of ancient Church music, and a revival of ecclesiastical vestments, monastic institutions and guilds, with many revived ceremonials mainly but not exclusively religious. Not exclusively so, for we may quote, as an instance, the installation of Lord Palmerston as Lord Warden of the Cinque Ports, when some erudite official having unearthed the ancient order of proceedings for such cases made and provided, an order long disused and forgotten. Palmerston, one of the last men to have appreciated it, underwent a very quaint and decidedly tedious form of installation, surrounded by a number of worthy town councillors and beadies attired in wonderful garments, which had excited the astonishment (and from personal observation, we must add) the laughter, of the good people of Dover, as they moved in solemn procession through their streets. Classical antiquity was, once, for a time, the subject of a more prevailing revival in France, when the "Jeunesse dorée," just emancipated from the severities of the Reign of Terror, broke out in wild enthusiasm for Classical costume, accompanied by what, rightly or wrongly, they considered to be classical morality. It would lead us, however, from our subject, did we pursue the question of actual revival of bygone art and customs. The present Renaissance of early architecture is of course professedly supported on the simple ground of its actual superiority to the revived Classical taste which it seeks to supersede, and its greater adaptability to our climate and circumstances; and the adoption of church ceremonial, vestments and music, unknown to the great body of the people for three centuries, together with guilds, sisterhoods, and monasteries, with their quaint rules and minute observances, is largely dependent on

religious doctrines, with the discussion of which we are not here concerned.

Archæological knowledge and taste being thus widespread, it was not likely that modern art would escape their influence. With the increase in general information as to architecture, manners, dress, language, and modes of thought that prevailed in other days, there has grown up a sense of the necessity of incorporating that knowledge in our historical pictures, romances, and acted dramas; so that it has come to be required of our painters, authors, and stage-managers that their work should embody the latest information that has been acquired on these subjects. This movement was essentially new. It is not merely that in old days they were well informed or so accurate in attending to such matters as we are, but that they would appear to have abstained deliberately from any attempt at accuracy. There was a time when the painter, in whatever age or country his scene was laid, adopted simply in his work the dress and architecture of his own day; and that not from ignorance or carelessness. Veronese could not possibly have thought that the shepherds who adored the Infant Christ were attired as Italian mountaineers. Shakspeare was quite aware that artillery was not in use in the time of Julius Cæsar; and Garrick knew, as well as we know, that Macbeth did not wear a powdered periwig and laced coat. It was not in ignorance that Schiller referred to lightning-conductors in a scene laid a hundred and fifty years before their invention.

It is not wonderful that critics of our own age, impressed with the importance and interest of accurate knowledge of such details, should dwell upon the glaring anachronisms which abound in the works of our ancestors, and see nothing but simplicity and ignorance in their practice of rendering epochs earlier than their own with accessories derived from the times in which they moved. Still less can we wonder that they should refuse to tolerate for a moment the idea of such a practice being adopted in our learned and critical time, and should rate highly the works of those men who have painfully striven to reproduce every smallest detail with the utmost historical exactness. But it is open to us to ask the question, whether it is really necessary or desirable that the poet or painter should seek accuracy on these points?—whether the artist ought to be an archæologist? Without professing to lay down any final law upon the question, we may suggest some considerations against the modern view of the matter.

It has been said that the men of old would appear to have deliberately discarded accuracy in these points; and we think that they did so not merely because they considered that in dealing with past events, historical correctness in costume, architecture, manners, and speech, was unimportant, and that they cared not to make any display of knowledge in such particulars. It seems rather that, consciously or otherwise, they were possessed by a conviction that their business was with nature, not with erudition; that it was theirs to create, not to collect; and that from the actual world of nature and humanity around them could they alone receive those impressions to embody which in their works was their true province. "Art," says Emerson, "is nature passed through the alembic of man," and the alchemist felt that it would spoil the purity and simplicity of his result if he added, in his retort, all sorts of information about matters which could only come to him at second or third hand. Humanity is in all ages and climes fundamentally the same, under all changes of fashion and modes of thought, and he who has the gift of insight, and draws from the life and not from books, from nature not from documents, cannot lead us far astray, though on his every page and every picture the critic can point out what he calls the blunders of ignorance or of carelessness. "Local colour," as it is called, appeals, after all, to the learned and critical; truth to nature

and humanity touches the heart of the mass of men. Maurice has well pointed out that Oliver Goldsmith "compiled histories without much learning about the people he was writing of, yet he did not make them false or foolish, because he had more notion than many diligent historians have of what men must be like in any latitudes;" and in the same lecture he attributes the superiority of the Greeks and Romans of Shakspeare (who knew little or nothing of the Classics in the original) to those of Ben Jonson, who was a good Latin and Greek scholar, to the same cause.

Some of the misconceptions which prevail in these matters seem to us to arise from inattention to the fact that art, unlike science, is not progressive. It is a mere truism to say that with all our growing knowledge we have never equalled Homer, Phidias, or Michael Angelo. There are, of course, in art, certain technical processes to be learnt, and the experience of centuries has made the acquirement of these processes more easy, and produced vast improvements in methods and appliances; but all these processes may be perfectly taught, and all these appliances may be supplied to a hundred students at South Kensington, without imparting to one of them the essential quality of an artist. In architecture and painting there have grown up certain more or less acknowledged rules of composition in colour and chiaroscuro; but the works of a great genius will often be found to set all such rules at defiance; and if they are observed, it will be in virtue of their essential rightness, and often with entire unconsciousness on the part of the artist.

This, then, we take to be one sufficient ground for contentment with the method of the old masters—that their work was infinitely the better for the fact that their attention was exclusively directed to nature and humanity as they saw them, and was not distracted by attempts at profound archæological correctness. It would not be difficult to show, for example, that one reason for the great inferiority of our playwrights to the older dramatists is that the latter had no help from the costumier, the scene-painter, and the machinist, and were driven to rely entirely on literary and histrionic talent for their success, whereas now, the dialogue and plot are often but a framework for historical tableaux and scenic effects.

But there is another advantage to us, derived from the ancient practice. In early literature and art, whatever subject is treated, we get a deeply interesting picture of the time and surroundings of the artist—a picture all the more faithful in that the drawing of it for the instruction of later times was no part of the intention of the artist.

Of course we value the great workers of old for deeper reasons than this; still, we cannot but delight in such fresh glimpses of contemporary life, drawn from actual observation, as we get in Homer and Shakspeare; we rejoice that in Raphael's Madonnas we get portraits of the Roman girls of his day, and that Dürer has clothed the quaint company in his "Betrothal of the Virgin" in the large hoods and odd round hats which were the fashion of his time, and grouped them under the Gothic arches under which he lived. Such a work as Chaucer's "Knight's Tale," the scene of which is laid in the days of Theseus, is an anachronism throughout, but in its complete failure to embody the external life of ancient Greece, it furnishes most interesting pictures of the era in which it was written. Much of our appreciation of Hogarth's work arises from its fidelity to the times, though doubtless his devotion to the embodiment of contemporary life cost him some popularity in his lifetime. In men of a lower intellectual rank, such as Pepys, Evelyn, Walpole, and Boswell, this quality of fidelity to actual contemporary life, combined in greater or less degree with quick observation and agreeable style, is often our only reason for valuing them.

While, then, works of art which thus embody



the era in which they were produced increase in interest with lapse of time, those which are composed on what may be called the archæological principle proportionately decrease. What will our descendants care about Holman Hunt's opinion as to the probable architecture of the Jewish Temple and the costume of the doctors, carefully as these details were studied on the spot where his scene was laid? In spite of the conservatism of Eastern costume, it is hardly likely that the dress has been quite correctly ascertained, and as far as those sacred pictures where the landscape has been painted on the exact spot which was the scene of the incident represented or was believed to be such, there is no doubt that the very face of the country has changed, and what was then a land flowing with milk and honey is now almost a desert; and the country whence came the cluster which two men could scarcely bear does not now possess so much as a grape-vine. The shores of the Lake of Galilee, once populous with fishing villages and considerable towns, are now desolate, and nearly uninhabited for months in the year, owing to change of climate, brought about by loss of forests which then clothed the surrounding hills. As time goes on, deeper research shows the necessary imperfection of our present knowledge. Scott was esteemed, in his time, to be strikingly correct in his "local colour," and a modern writer on costume has somewhat extravagantly attributed to this quality half the value of his work. We know now that his historical romances are full of error in heraldry, architecture, and costume, and if there had been nothing more in Scott than his archæology, his fame had scarcely lasted to our day. Familiarity, moreover, has robbed these details of their freshness and strangeness, even when they were correct enough. The new-born enthusiasm for Gothic architecture, for instance, which he was one of the first to awaken in an age when it was generally despised, even by cultivated men, has become somewhat tamer, and we are apt to dwell now more upon his mistakes than his erudition. Witness the carved bosses which had clenched the groined roofs of Melrose, and which he incongruously stuck upon the flat ceilings of Abbotsford. And in the department of costume, in which he specially delighted, we cannot help observing that Richard Cœur de Lion is arrayed in armour proper to a period 400 years after his death. Of what value, then, are Scott's impressions of earlier times, since they are partly trite and partly inaccurate? What we do value in him, and what our descendants will probably value more and more, are his delineations of contemporary Scottish character, manners, and dialect.

Surely the art which dwells upon matters the interest of which must necessarily die out, and which is thus more or less distracted from the immediate study of nature and humanity is, so far as it does so, inferior art,

We have spoken at some length of the works of Sir Walter Scott, because the modern phase of archæology in art may be said to have been inaugurated, as far as our own country is concerned, by him. Passages such as the following, from the "Lay of the Last Minstrel," illustrate the commencement of a new era in literature—

"Costly his garb—his Flemish ruff  
Fell o'er his doublet, slashed, of buff,  
With satin slashed and lined;  
Tawny his boot, and gold his spur,  
His cloak was all of Poland fur,  
His hose was silver twined;  
His Bilboa blade, by Marchmen felt,  
Hung in his broad and studded belt."

This new fashion was by no means favourably received among contemporary critics. The *Edinburgh Review*, in reviewing "Marmion" on its first appearance, ridiculed most unmercifully the amount of space devoted to details such as those of which the foregoing extract is composed. The reviewer complains of the minute descriptions of knights and

ladies and their trappings, but he becomes fairly exasperated when called upon to listen to a long account of the livery of lackeys, and the colour of their stockings. We remember, too, how Scott's antiquarianism was parodied, but not in the least exaggerated, in the "Rejected Addresses":

"Survey this shield, all bossy bright—  
These cuises twain behold!  
Look on this form in armour dight  
Of steel inlaid with gold;  
My knees are stiff with iron buckles,  
Stiff spikes of steel protect my knuckles."

And again, in the description of the firemen at the destruction of Drury Lane Theatre:

"Each sought his pond'rous hob-nailed shoes,  
But first his worsted hosen plied,  
Plush breeches next, in crimson dyed,  
His nether bulk embraced:  
Then jacket thick, of red or blue,  
Whose massy shoulder gave to view  
The badge of each respective crew,  
In tin or copper traced."

The impulse which urged the genius of Scott in this direction was, doubtless, derived from Germany. Before he wrote "Marmion" and "The Lady of the Lake," he had published a translation of Goethe's "Götz von Berlichingen," a work which inaugurated that Mediæval romantic school in Germany, which Goethe himself lived to discard and condemn.

It may further be noted, though applying rather to literary than pictorial art, that even were the author quite correct in his material reproduction of past time, he must fail more or less, in catching its spirit. An author living in the nineteenth century can no more divest himself of the ideas of his time than he could by effort of will strip himself of all his acquired knowledge and place himself in the intellectual position of the untutored savage. This may be illustrated by a comparison between the different productions of those authors who have laid the scenes of their works sometimes in modern and sometimes in ancient times. In Kingsley's "Alton Locke" and "Two Years Ago" we see modern English life and thought as that earnest religious Liberal saw it. Granting that the selection of types of character may have been influenced by opinion, the types and the opinions were there. In his "Hypatia," on the other hand, can we trace modern religious ideas through all the clever reproduction of the Alexandria of the fourth century? A stronger instance is the difference between the "Romola" of George Eliot and her last work "Middlemarch," because this writer enforces no moral and has no apparent predilections. "Middlemarch" will always be the perfect picture of life in an English provincial town of the nineteenth century, but "Romola" wonderful for its subtle developments of character in individuals, does not, according to very competent authorities, reproduce the real Florence of the days of Savonarola.

Tennyson's Arthurian Epic, perhaps, scarcely professes to realise the actual times of that monarch, but it is worth noting that to a court which flourished about 500 years before the Norman conquest, he has appropriated the costume and architecture, and the laws and observances of chivalry, which grew up under the Norman and Plantagenet kings. This is, of course, accounted for by the fact that the Mediæval legends of King Arthur and the Round Table were the sources upon which he drew. The tone of thought is, however, quite modern; perhaps, in this instance, partly intended to be so.

We might well illustrate the impossibility of escape by the poet from the influences of his time, were we to compare the difference of tone and manner manifested in the works of those who in different ages and countries have treated the subject of the unseen world and its supernatural inhabitants. Milton, for example, in a time of dogmatic Protestantism, makes his angels discuss knotty theological questions with Adam and Eve, just as one of Cromwell's militant preachers would have

done, but his descriptions of the other world, and its good and evil spirits, are vague, mysterious, and unoutlined, both in character and person. Dante, on the other hand, undisturbed by much difference of opinion on doctrinal points, and supplied by his church with distinct information as to every detail of the structure and arrangements of the three realms of blessedness, purification, and endless torment, admits no theological controversy into his work, and describes the various divisions of the unknown world as a surveyor might do who explored an unknown city with measuring rod and theodolite. In strong contrast with the method of both these great poets, take Mrs. Barrett Browning's treatment of a similar subject, in an age which shrinks from definition in the region of the infinite and unknown. Her poem, "The Seraphim," concludes with an apology to the angels for her attempt to personify them, and to

"Counterfeit, with faculty earth-darkened,  
Seraphic brows of Light  
And Seraph language never used or hearkened."  
and beseeches them to

"Forgive me, that mine earthly heart should dare  
Shape images of unincarnate spirits,  
And lay upon their burning lips a thought  
Cold with the weeping which mine earth inherits."

If we attempted to trace the history of the modes in which costume and accessories have been dealt with; we should have to show that the early practice of drawing simply upon the contemporary surroundings began to be discarded under the influence of that movement which we commonly call the "Renaissance." All culture was transfused with the Classic spirit; poets and painters betook themselves to ancient Greece and Rome for their themes; and while architects analysed and reproduced the Classic style, artists loved to display in their works the fruits of the novel researches into Classical antiquity. So strong a hold did this spirit gain upon them, and so habituated did they become to togas and sandals that, by a strange process, they came to apply Classical costume and manners to their own and other times and countries. So in poetry we had pastorals after the manner of Virgil, with their modern swains and shepherdesses. Damon piping to Phyllis in a leafy grove, and Corydon discoursing with Amarylus, in a style which would have astounded the rough English shepherds who were supposed to be represented. In painting we may refer to such instances as Raphael's Galilean fishermen, arrayed in robes that sweep the ground, and, to come to later days, we know that Copley was severely criticised for having discarded the Classic costume, and having clothed the soldiers, in one of his great contemporary battle-pieces, in the military costume which they actually wore. This most absurd of all conventionalisms has hardly yet disappeared. Men whom some of us may be old enough to have seen walking our London streets in the ordinary costume of an English gentleman, appear in effigy in our public places wonderfully arrayed in sandals and a Roman toga, and no other garments.

Though much more might be said, it is necessary that these rough notes of an interesting question should be brought to a close. We conclude, therefore, by saying, that if we are asked whether, after what has been said, we intend to propose the representation of the incidents of other times and scenes with the accessories of our own, that we have not the courage to be the advocates of such a course. The age is too self-conscious, too critical for such a venture. It could not be done innocently and unaffectedly. If Mr. Hook were to undertake a scriptural subject, we suppose he would hardly venture to represent St. Peter and his fellows in the guise of those bluff fishermen whom he paints so well. Perhaps we should not like to see it done, but we may be permitted to rejoice that the great painters of old were not of that opinion. It is, perhaps, this difficulty that



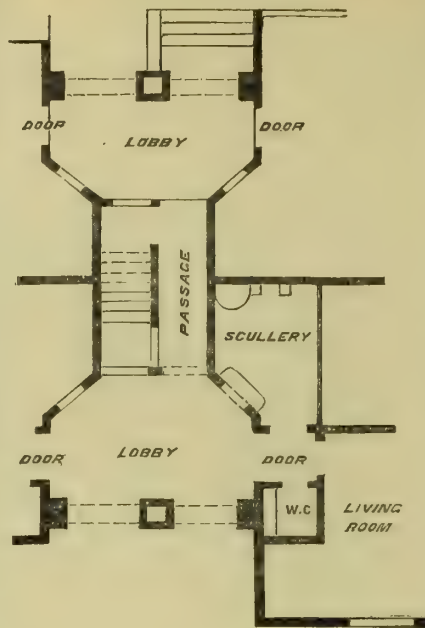
led Ruskin to deprecate all historical art, except that drawn from contemporary events; but this would be to forbid to the painter and the poet some of the most exalted themes upon which their genius could be exercised. We confess we have no solution of the difficulty, and we must, therefore, be content to have suggested some aspects of the question which may be worthy of consideration.

#### THE IMPROVED DWELLINGS OF THE METROPOLITAN ASSOCIATION, FARRINGTON-ROAD.

HAVING visited the newly-opened blocks of buildings in the Farringdon-road erected under the auspices of the above Association for Improving the Dwellings of the Industrious Classes, inaugurated by the Home Secretary (Mr. Cross) last Friday, we are in a position to describe in detail those features of the undertaking which place the efforts of this Company in the provision of cheap and healthy dwellings among the most successful and promising of the day. Established upwards of 30 years ago, it has provided accommodation for over 5,000 persons, and has seen the commencement and progress of kindred societies of varying success. The work of this Association has conferred direct benefits upon the classes of the industrial population for whose comfort it was established, while its example has been calculated to stimulate younger companies to similar laudable endeavours. We need only mention the Gatliff Buildings, Pimlico, providing accommodation for 620 persons; the Ingestre Buildings, Golden-square, accommodating 369; the Bermondsey Buildings, for 651; the Pancras-square Buildings, for 637; the Albert and Victoria Family Dwellings, near Spitalfields, for 427, among the dozen establishments it has provided, to indicate the extent and usefulness of its operations. In the Farringdon-road Buildings the experience of the Association appears to have been concentrated. We find all the main advantages without the weak points of the former dwellings. The flat or block system has been adopted; and in a dense locality inhabited by the industrial classes, and largely by watch-makers and working jewellers, we find provision for 263 families, or in all 1,300 persons (5 persons to a family), upon a plot of land of about three-quarters of an acre, or 33,880 square feet of ground. Of this area, about 16,000 square feet are appropriated to the areas and approaches which separate one block from the other. There are five blocks, each of fifty-two dwellings or "sets;" each block being of seven stories, including the basement. When we say a family can occupy a "set" of two rooms, including a wash-house or scullery, from 4s. 9d. to 5s. 3d.; a set of three rooms from 6s. 3d. to 7s., and a set of four from 8s. 6d. to 10s.; and that nearly 200 sets have already been let, the most doubting will be convinced that the proof of the undertaking has been in its success. Each set of rooms contains a sitting-room of about 18ft. by 12ft., one or two bedrooms, a water-closet, wash-house (with a copper, cupboards, sink, and a small stove). Each room has ventilation by an air-brick inserted near ceiling level, which communicates by a small flue in wall to another air-brick at the level of the window-cills of the windows above. These ventilators have been in some instances covered over by the occupants, showing that pure air was not regarded as such a decided advantage over a close atmosphere.

The completeness of each set is further secured by being shut off from the intervening passage by iron wickets, the said passage-way or landing becoming a thorough air-space or belt between each pair of dwellings on the same floor. The outer ends of the passage form the entrance-lobbies to each adjacent pair of "sets;" the staircase occupies the centre portion of the passage, from

which it is screened by a close brick wall. We give a rough sketch of this arrangement.



Both the passage and the stairs are of concrete finished in cement. Each block of dwellings is divided transversely by two of these passages, or common landings, extending upwards from basement to roof, thus dividing the block into three portions, which on each floor are appropriated as follows:—

End.	Passage.	Middle Portion.	Passage.	End.
Two Sets.	Four Sets.	Two Sets.	Four Sets.	Two Sets.

As it is in the arrangement of the staircases and cross passages which chiefly distinguish these dwellings from others of the same class, we may compare the open-galleried arrangement observed in various parts of London, and some of which, erected by the Corporation, may be seen opposite the new buildings in Farringdon-road. In these instances the staircase becomes an external feature exposed to driving rains and other inclemencies, while the galleries are open to even greater objections, as want of privacy between the occupants, the exposure of clothes hung on the railings, &c. Where the communication and landings are so arranged, it is impossible to give that privacy and domestic comfort which the working man and his wife require in return for giving up their small though unsanitary domicile, or that they can enjoy those immunities so prized by Englishmen. The great principle to be attained is complete separation of dwellings, with all the structural and economical advantages derived from association of number. When this is fully realised the problem of cheap and sanitary dwellings for the people will be solved. Anything that detracts from the external appearance of comfort or cleanliness, as the open balcony plan, which makes the common drying ground of the inmates a source of annoyance, or which brings together the gossip of the place, is an evil.

We will not say that the detailed arrangement of the dwellings Mr. Cross opened on Friday last is perfect; there appeared to us a little deficiency in the economisation of room space; still we think the principle adopted is a correct one, and only needs a little experience to render it perfect. Let us here take note of the materials employed, and some details of construction that seem to answer well. The chief materials throughout are brick and concrete finished in cement; little or no timbering exists, as the walls are continued uninterruptedly throughout all the floors. In case of a fire in one of the dwellings, though we hardly can see how one

could originate unless in the furniture of one apartment, the through air passages we have alluded to, would effectually cut off all communication with other parts laterally, as the stairs and landings are of concrete, and thoroughly fire-resisting; while the floors, formed also of concrete on rolled iron joists, would stop the ascent of flames. We may add that the concrete is made of coke breeze, and the surface of the landings and steps floated with cement, the floor of each dwelling room being boarded on battens, and satisfying all the demands of comfort. The rolled joists are about 2ft. 3in. apart. The roof has been utilised as a drying-ground, it being a perfect flat, and commands a most extensive view of the pigmy buildings around. Its surface is finished with Val de Travers asphalt. Over each staircase a water-tank containing 1,500 gallons of water, of the New River Company, is placed, affording abundant and constant supply within certain limits. The ashes and dust of each "set" is easily disposed of. The centre pier, which helps to carry the outer lobby landing is also a shaft, and each landing is furnished with a hinged iron flap about 9in. by 6in. through which the dust may be shot, a vaulted receptacle in the basement under the front steps being the temporary depository. All the closets are fitted with Doulton's D prize-medal pans, and a 2-gallon flushing cistern; and each sink, which is of galvanised iron, is provided with a 3in. stoneware trap, the space under the sink (a good precaution) being also an inspection place, access thereto being sealed from ordinary interference.

Cupboards are amply provided between the stacks of flues or chimney breasts. The chimney pieces are of cast-iron, and each sitting room has a good range. When we contemplate the wretched hovels in the immediate vicinity of these dwellings, as Fryingpan alley, Flag-court, and other fever-engendering places, and that this low class of accommodation provides for only 340 persons to the same area as these improved buildings, which accommodate 1,300, we certainly congratulate the Association, and can estimate at its right value the great work they are accomplishing in the midst of a vast working population.

The cost of these buildings has been about £8,000 a block; Mr. Fredk. Chancellor is the architect; the contractor is Mr. James Brown, of Finsbury-circus; the clerk of works Mr. Thos. Hartnall.

#### ST. PAUL'S—SHALL IT BE "DECORATED" OR "PAINTED"?

WE have already more than once endeavoured to throw some light on the very difficult problem, for a difficult problem it is, of the decoration or "adornment" of St. Paul's Cathedral. The time is now come for some definite decision, and the Committee of "Adornment" must make up its mind as to the course to be pursued. It may therefore be useful to again recur to the precise position of things, and to the momentous problem of what finally to do. Poor Christopher Wren! We often think of him, and of his great predecessor, Inigo Jones, and wonder, at times, what sort of a place London would have been could they but have begun and finished London City after their own Renaissance, or "Greek and Roman" fashion of work. Such a "London," indeed, might have worthily, and artistically, and picturesquely, replaced "Gothic" London. We say this parenthetically, for their fragment of London is fast disappearing, and can soon live only in a printed page, or in an old, worn, and foggy print. St. Paul's will surely be the last thing improved away; but who knows how long it will last if but the fearful work of adornment or improvement goes on as now? Can this be bettered, or the tide of it in any way turned? that is now the question.

In the first place, we do not think the ques-



tion of mere *cost* should, in considering this problem, stand in the way of a really fine and worthy idea for the "adornment" of St. Paul's. If the fund in hand, and in prospect, can do but little, then that little should be confined to one spot, say the apse end or the dome, if nothing more; for that little, well and artistically done, must surely be better than to cover the *whole* inside of the Cathedral with "ornamentation" which can be estimated by the square foot or yard, and contracted for by a "firm of decorators." We mention this because Mr. Fergusson, in the *Contemporary Review*, was very angry with Mr. Burges for going so far beyond the received estimate. The *artistic* element should surely stand first. Putting, therefore, this aside, and looking only to what *ought* to be, and is possible, what is the best way of adding to the impressiveness and beauty, and even grandeur if you will, of St. Paul's Cathedral? We think we may take a little credit for having inaugurated the true adornment of St. Paul's according to Wren's own idea of it; for had it not been for the note of warning in the *BUILDING NEWS*, the whole of the interior of St. Paul's would have been now coated over with three or four coats of thick common oil-colour, as near as could be to the colour of the newly quarried stone. This was Mr. Penrose's notion of "adorn" St. Paul's. It is, indeed, comforting to see that a great part of this oil-colour has been removed, though not all of it, by the way, and that in time, as we may hope, the whole of the interior of St. Paul's will at least be free of imitative stone colour. This is a great gain to begin with.

We will suppose, then, that the whole of the interior of St. Paul's is clear of the artificial, and that then the problem comes, as it does now, before the Committee of Adornment: What is to be done in it, and by whom? There are but two answers to these momentous questions. The true and worthy decoration of St. Paul's must be to *paint* it, and that painting must be by *painters*. The Sistine ceiling, the Arena Chapel, the Chapel of St. Paul, Lucca, our Whitehall Chapel, and not a few others, are fair examples. It would be not a little useful to have a good list, and an intelligible description of these; and we would urge upon the Committee to obtain and look into such before they go to work with St. Paul's; for the more thoroughly this subject is examined, the more sure do we feel that in the idea of painting it will be found the true solution of the problem. The roof, the windows (perhaps), the spandrels over the arches of the nave and apse end; and, as a separate and distinct idea—the roof being one, and the archspandrels another—the whole of the panels beneath the windows of the north and south aisles, there being three under each window all round the cathedral. Here, indeed, opportunity would occur for a truly magnificent series of illustrative Scripture pictures or bas-reliefs, the one following the other in consecutive order, and telling a story which *all* might read closely and easily. It may be a question, indeed, whether it would not be good to begin with these panels, as test-work, easily worked at, and within reach and sight, and equally easy of removal if found unworthy. No complicated and expensive scaffolding would be required here. We would commend this to the notice of the Committee. The work in the dome, whatever it be, might well be last, because most difficult.

It may help to make this difficult and well-nigh impossible problem of the adornment of St. Paul's somewhat plainer and more intelligible to many if we put the matter "personally," if we may use the term—for artistic work always supposes a personal artist. Mr. Burges, we hear, no longer holds the appointment of artist decorator to St. Paul's, but perhaps he will be called upon by the Committee of Adornment to try his hand again at it. Let us, therefore, single out a bay of the apse end of St. Paul's by way of

illustration, and try to see what can be done, keeping in mind the many difficulties in the way, let who will do it. We suppose that the first work would be to entirely clean away the whole of the paint or yellow wash on the roof, and the gilding on its mouldings, and thus to get free to work on the plain stone surface, the surface of the roof, and the sharply-cut mouldings and ornament on it. What would then be the first thing to do? Why, a geometrical section to a quarter-inch scale of one bay, and plan of the roof over it, with its large circular panel and four triangular lunettes, and the triangular panels on either sides of the arches of the bay above the supporting piers. Here, then, is the *tabula rasa*—the blank architectural outline forms and tables on which to write a something. What is that to be? What can the architect, who is neither painter nor sculptor, do? Wren, with a true instinct, did commence the work of "adornment," for he put Gibbons, the foliage-carver, to work every here and there, to cut out of the actual stonework of the building the architectural ornament he, as architect, thought needful. An admirable beginning!

Wren went, as architect, no further than this—to suggest that the apse end of the church should be of marble instead of stone; and there can be little doubt that had he had coloured marbles on the ground instead of Portland stone, he would have used them, not as coatings over the stonework, but as solid constructional marble interior work. No modern man but would doubtless do the same. But this is not to decorate or adorn a stone-built church, but to build a marble one. What was Wren's next move, as far as he had opportunity and power to do anything at all? Why, Sir James Thornhill painted the dome, and Wren left him, as an artist painter, to do his own proper and individual work. Wren has thus left instructions as to what should be done, just as plainly as a specification of works by him in his own handwriting, and laid before us, could have done. Wren was a true artist workman, and kept truly to his own work, not going, or attempting to go, beyond it. What a lesson has he here read to modern men! What, therefore, is an architect to do with this sheet of blank architectural forms of Wren's? It is a mournful thing to say; he has, with the sanction, and, may be, help of the Committee, but to write on these paper panels the subject of the pictures, the order for the painter. The painter then, when found, doing in his own way his own proper work, without help or hindrance. And a wonderful thought here occurs to one worth taking to heart. It is this:—that in exact proportion to the power and individuality of the painter's work, does the necessity for any additional architectural adornment diminish. "Those Prophets," said M. Angelo, to Pope Julius, "need no gilding."

And now the question of questions comes—Who are they who are to execute these pictures thus indicated for them? We can but glance at the question, for in it lies the most momentous of art problems. The Royal Academy, if it does not contain the whole of the best men of the country as artists and painters, certainly does contain a goodly proportion of them. Will one or more of these Academician painters, then, and on what terms, go to work on the circular panel of the roof, or on one of the triangular lunettes close to it, he choosing, or not, his subject, but treating that subject in his own special way, and painting it himself? It would seem to be well-nigh impossible for the Academy historical painters, if they but think of it, to reject this work. We can hardly imagine any man capable of such work at all rejecting the glorious opportunity. It is a far better one than Michael Angelo had in the Sistine Chapel, or Correggio had in the Pauline Chapel, Lucca. Out of the history of St. Paul the subject might be, or the history of early Christianity itself during the life of

its Founder, from Birth to Crucifixion. What opportunities for a something new and strange, and, may be, more vivid than anything yet accomplished in the limner's art! Might not, for instance, the very tone of the colours change from the portrayal of the incidents of the early life to the gloom of the Crucifixion? And might there not be opportunities for more lifelike likenesses in the treatment of costume, and in the colour of that costume? Ecce Homo! The "Man of Sorrows," be it remembered, though it seldom is, was a very, very poor man, without miraculous supply of either food or clothing, or house shelter. He is represented always as regally attired, with robes of the richest texture and colour; but how different must have been the reality! Has not that ghost of "respectability" but too often done the work here, and well-nigh destroyed the true idea? The gaunt and half savage portrait and life of the Baptist shows but too clearly how fearful a price was paid, even in that age, for doing or thinking away from the multitude. Rembrandt's Christ, in the National Gallery picture, is infinitely nearer the actual truth than almost any other that can be named. Rembrandt's powers were well-nigh superhuman in his own special and individualised way. What a field is there here for newness of method, and ways of doing again work that has been done so often and so well, but which may yet be done again and again! But such individualised work must be accomplished by true painters, working each one by himself, and for himself. Such work cannot be indicated, and then superintended and manufactured. It cannot come from the shop of the mere trade decorator. It must come, if we ever have it, from the *bonâ fide* working artist, and surely we ought to find in the ranks of the Academy those who can do this work, and might rejoice to do it, and, may be, wonder at the opportunity. We would but say of the artistic world outside of the close walls of the Royal Academy, that supposing that it fails, it might be tried. It will hardly be said that no power of any magnitude exists out of the charmed circle. It might be that a something might come of an appeal to it, scattered widely as it is: Dame Nature distributes artistic power as she does aërolites, no man knowing where it will fall!

But let us assume, for the sake of indicating a road, that none of our own painters are able, from whatever cause, to undertake this great work; then, considering that these are days of Free Trade in all things, might not an effort be made by the Committee of Adornment to enlist the services of a foreign artist, as was done when the apse windows were "contracted" for? A wide subject here, indeed, opens out to us; for Italy, France, Germany, Spain, even hitherto mute and silent Russia, might perchance furnish us with the mind and manipulative skill for the work of painting St. Paul's. There has been no such opportunity in our day and generation, and all means should be tried before it is helplessly handed over to the mercies of a shop decorator. What, we would ask, would Gustave Doré be inspired to do, were but the blank panels, roof, and walls of St. Paul's offered to him to fill with his singularly individualised imaginations, and as individualised working out of them? Truly thus a new light and other shadows would then fill St. Paul's. If whoever has authority will take a hint here, he may seek out immortality in a new way, not by attempting the impossible task of hunting up a number of feeble assistants to fill the panels of St. Paul's with his designs, but to make all effort to put to work one man to think out and work out his own designs and imaginative creations and individualised handwork. While looking on simply he cannot fail to learn a mighty lesson, and to feel conscious of a new art keynote in St. Paul's. Wren did his work well. Doré might well do his; and any man might, indeed, equally well



find more than enough work in the difficult problem of the "Ritualistic arrangements" in St. Paul's—well nigh incredible as they are—and might find out in time that the finest artistic idea in all London was "put out" when old Bernard Schmidt's organ was out in two.

C. B. A.

### CONGREGATIONAL CHAPEL BUILDING\*.

IN the form of a neat manual, the English Congregational Chapel Building Society have issued a third edition of a very useful little guide for those interested in the work of chapel extension and building. The object of the compilers has been to compress within a small compass the results of increasing experience, economic methods of building, and rules for the guidance of those engaged in church-building. They say very truly, that in the use of right methods and plans, and the proper drafting of contract and conditions, a considerable saving in mere "extras" would accrue, equal often to a considerable grant. No one casting a glance over the chapels and places of worship of the Nonconforming bodies, built thirty or forty years ago, could believe it possible such vast strides could have been made in the mere matter of adaptation of confessedly simple places of worship. The Establishment, it is true, can show greater advances in architectural as well as in decorative details; but the comparison is hardly a fair one, the resources of the Establishment being so much greater than those of its younger rivals. In structural adaptation the Nonconformists can show important improvements if they cannot in all points of detail and artistic merits. We would only observe that their deficiencies are the result of a mistaken desire to imitate or adapt Church of England edifices to congregational purposes. It may have been to a certain degree a laudable desire to assimilate or emulate in some points, but it certainly is a mistaken one. Even the Church Establishment and her foremost advocates admit there is a want of adaptation in her fabrics, and the utterances of Mr. Beresford-Hope and Mr. Street, leading authorities in Church building, at the recent Congress, have shown that among the oracles of orthodoxy a strong feeling exists for a more appropriate kind of structure more adapted to the English ritual and to congregational wants. If this be so it were vain to imitate or adopt any portion of our semi-Medieval structures to congregational purposes. We hope, therefore, the Nonconforming church-builders, who are unrestricted and not tied to any traditional form of worship, will give us an example of correct architectural arrangements for congregational uses, unhampered by what the Anglican Church has done, or may do; as by so doing, we believe they will be acting honestly to their tenets.

Several points are broached in the little guide before us, partly provisional, and partly of a structural nature. Among the first we have suggestions as to preliminary efforts towards building, and the good advice that three-fourths of the entire cost of building should be secured before its commencement. As a mode of raising money to liquidate any debt, an efficient system of weekly contributions is strongly recommended, in preference to the large donations of the few, or to quarterly collections. The object of the Congregational Chapel Building Society is to make grants in aid of new buildings proposed, but not to aid in liquidating old debts on them. A brief paragraph informs us that in regard to distinctive names, the "ringing incessant changes upon the titles, 'Zion,' 'Ebenezer,' 'Zoar,' and 'Rehoboth' is now rarely reverted to in the

naming of buildings. Of all distinctive names those that are derived from the street, square, or immediate neighbourhood in which the building is situate are the best." Next to naming such buildings from locality, the association of the names of great and good men may be adopted. A congregational church, we are told, may be defined, "a building adapted to oral instruction, public worship, and fellowship." These three points must determine the form and details of the structure. Upon them we may here aptly give the gist of the hints.

The adequate provision for these three different uses, viz., oral teaching, public worship, and fellowship, is not so easily accomplished as may be imagined. One of these requirements may simply be provided for, but the others often interfere with or prevent its perfect attainment. No structure the architect is called upon to devise is more complex in its conditions than a modern church in which all wants are satisfactorily met, and yet it is a building in itself apparently simple compared with others he is called upon to plan. Let us, for example, take the requisites of public worship and form as regards good acoustical properties. The suggestions which seem to meet convenience in the one case frequently contradict the means necessary to accomplish the latter, and the architect has to elect which shall be the paramount consideration in each particular case. A flat-pitched roof or a low ceiling answers the sound question the best, although not always consonant with interior dignity of effect. Again, arrangements which bring every member of the congregation within the range of sight and sound may be open to the objection that they thereby face one another, destroying one condition and incentive to devotional feeling. As the motives of the Congregational Church Building Society are somewhat removed from those of the Establishment church-builders, we may quote their remarks here: "In the position, style and arrangement of our churches, there should always be a sincere and studied regard to public use; they should be built expressly to accommodate all comers." Again, "we have a mission to man. In church-building we are presenting ourselves in visible form before all men; let that form be such as may impress them as favourably as the case will allow; for so far as we consult public taste and convenience, we are likely to induce the public to attend and so turn church-building into a most important instrument of making known the gospel to mankind." This is rather different to the tone of some of the National church-builders.

As regards site, about seven square feet of ground is recommended for each adult on the ground-floor; this is exclusive of vestries. Five sittings for children are about equal to three for adults. It is a good plan in increasing and improving districts to secure beforehand a good site when it is cheaply and easily procurable. As to tenure and title, after freehold tenures, copyhold is best. Leases for shorter terms than 99 years are objected to, unless renewal can be secured. Some good hints on the necessity of correctness as to validity of title and dimensions are given, also, the importance of the vesting of the church property in trust. In choosing an architect, we are glad to find some wholesome advice is tendered; and what conditions are necessary in case of competition being resorted to, a course thought very undesirable; also the value of specific written instructions to the architect.

Remarking on "quantities," the suggestion that the Committee should pay for them, and give the builder opportunity of testing their accuracy before he signs the contract, is fair, and should, we think, be adopted in preference to the usual practice of allowing the architect or builders to adopt their own quantities, and throwing all cost and risk on the builders. Equitable conditions are far surer

of promoting economy than unfair ones in these cases.

Passing over some carefully-digested observations on "drawing up contracts," "economy in building," the evils of unlimited competition in tendering, the choice of contractors, and temporary buildings, let us here refer to some of the main structural points inculcated, and, first of all, Plan. A rectangle, whose width is half or two-thirds the length, is generally the proportion adopted; the former ratio is thought best for Gothic, and the latter for Classic treatment. We certainly should base any proportion of plan not on style so merely, but utilitarian wants. If architects consulted the latter more than they usually do, some better hope may be entertained of solving the difficulty of congregational church-building. A rectangular or apsidal recess behind the pulpit may be allowable, and such a recess is certainly better lighted by side windows as suggested, or by an upper light. This recess is useful either for the choir and organ, or as giving greater space in front of the pulpit for the congregation. Slight transepts, not so deep as to obscure the sight of the preacher from the occupants, are useful in some sites, as they focus the congregational area, and are certainly more helpful of external effect. Little is said on plans based upon circular and polygonal forms, though we should be inclined to venture more experimental efforts in this direction. For instance, how thoroughly appropriate and architectural the Greek cross, or plans founded upon the octagon or square, may be made, and we know of few such adaptations at present. Moreover, these types afford the best means of making galleries architecturally effective; they are anything else at present in the ordinary rectangular form, and it is hardly within the power of skill to make them other than platforms or scaffold-like excrescences. An end gallery facing the pulpit is better than side galleries, and may possibly correct the echo in long and lofty buildings. It is suggested that side galleries "should not be nearer each other than 20ft., or when the building exceeds 40ft. in width, half that width. We may note a few hints given. The bottom of gallery beam need not be more than 8ft. from ground level. Each seat should rise above its front one 15in., as an average, the pitch, of course, being regulated by the pulpit's position and height. The back seats of a deep gallery should have a steeper rise than those in front. Fronts should be as low as possible under 3ft. Open work fronts may certainly do much to relieve a long gallery. One point we find advised that we hinted not long since, namely, the importance of keeping the supports or pillars some distance back from the front of gallery, 2ft. 6in. at least. Nothing is said about curved galleries, as we see in the new City Temple, Holborn. Why curved galleries should be consigned to the architecture of the histrionic kind we cannot see; but structural difficulty would appear to have something to do with it, but without any great show of reason. The position of the organ has been a moot point both with Episcopalians and Nonconformists; the old end gallery has at last consigned its trust to the organ-chamber in the former case, and the same idea has been gradually taking root among Congregationalists. There is nothing to be urged against its new position, though an end gallery recess would be equally good, and this might be obtained on the upper floor of a tower, the gallery being used for the choir. The question of style receives a full consideration, and important though it be, we prefer to discuss the more mundane topics of church arrangement and details. A recapitulation of the ancient and modern styles is given, good in its way, though to our minds the value of so brief a résumé of the differences of Grecian, Roman, Byzantine, and Gothic styles, seems hardly in keeping with the object in view, and can be of little use to the architect. It may be as

\* "Practical Hints on the Erection of Places of Public Worship, compiled under the direction of the English Congregational Chapel Building Society." By Rev. J. C. GALLAWAY, A.M. Third Edition. London: JOHN SNOW and Co.



well to remark, however, that the Society does not restrict its taste to one style; that Greek, Roman, Byzantine, Gothic, and Renaissance, find equal favour, though its *penchant* seems to lean to Gothic of the Early English period. We are told the Gothic seems "likely to be generally preferred" on the score of its cheapness and distinctive character. About the first of these advantages we are inclined to be a little doubtful, seeing that so many Congregational buildings have emulated the most expensive and pretentious features. That the traditionary church architect has inherited like features is not to be wondered at. There are some conspicuous exceptions to this remark, which we gladly acknowledge. Percy Chapel, Bath, and Bedford New Town Chapel, London, are examples in which the round-arched Lombardic and Romanesque have been adopted. In the Early English, the chapel in the City-road is cited, and Arley Chapel, Bristol, as an adaptation of the Renaissance. Clerestory arrangements and lighting offer some advantages not to be neglected; and a hint we have before given is repeated that a clerestory is not, necessarily, the outcome of arcades, but may be carried on trusses. The combined use of iron and wood is also suggested, and at no remote period will be adopted. Ceiled plastered roofs (the ceiling leaving an air-space between it and the slates) instead of boarding is another sensible hint that all church-builders would do well to adopt. We are told "One secret of the cheapness of Gothic lies in the open roof, and consequently low wall;" but it would be well to consider whether a high-pitched roof or arched walls is really cheaper than a low roof? We opine not. As to walls, we gather that Portland cement concrete, with proper bonding and piers at intervals, is favoured, and if church-builders were to turn their attention to such kinds of material, we think it not unlikely that a new style would sooner come into vogue than is likely by any amount of writing on existing styles. It is curious that the perceptions of Ecclesiastical Commissioners should have become so blunted by perpetual reference to traditional modes and materials that we have to turn to the experience of younger societies to learn that hollow walls are better than thick, solid ones—yet it is so. Plaster facing with the selenitic lime is recommended. We have not space to allude to other details—church furniture and fittings; this we will do in another article. In the meantime, we recommend this little guide to all concerned in building places of worship for every denomination, as we are sure a discussion of the best methods in the light of our present knowledge would not prove fruitless.

#### MR. WM. BURGESS AND ST. PAUL'S CATHEDRAL.

IN obedience to a general demand and a general expectation, Mr. Burgess has had to relinquish the task of completing and decorating St. Paul's. This will excite no surprise, but it will remain a matter of surprise how Mr. Burgess, of all men in the world, could have been appointed. Mr. Gladstone, who, though he is not the Prime Minister, appears to rule men's minds more than during the period when he was, said, in his celebrated article in the *Contemporary Review*, that the English people make great mistakes in art matters, and he instanced the selection of Sir Charles Barry, who was a Classic man, to superintend the erection of Gothic Houses of Parliament, and of Sir Gilbert Scott, a Gothiciest, to superintend the erection of Classical foreign offices. He might, with propriety, have pointed to a third instance—that of selecting Mr. Burgess, who "abominated" Sir Christopher Wren's works, and who out-Heroded Herod in his Gothic predilections, to superintend the completion and decoration of Sir Christopher

Wren's great Renaissance structure. The anomaly was so unique and so complete that many wondered and more laughed. Some wondered pretty much in the same way as, according to Peter Pindar, George the Third "of glorious and immortal memory," wondered how the apple got into the apple dumpling. They wondered how it was that Mr. Burgess, who would have liked to see St. Paul's Cathedral improved off the face of creation, was selected to adorn the building. Whilst the many wondered, the few criticised. The BUILDING NEWS, through "C. B. A.," who writes on the same subject in our impression to-day, led the way. He was followed by *The Times*, and a dozen other papers. In fact, the verdict of condemnation against Mr. Burgess was unanimous, with one or two exceptions. During this time Mr. Burgess, *in propria persona*, said nothing, and he is not a man to remain silent when he has a good cause to defend. The criticism was so overwhelming that it appeared to have swept him off his feet. At all events, he said nothing in his own name. The result is as almost every one expected. The Committee have decided to do nothing for the present, and Mr. Burgess retires, "defeated, but not dishonoured." So much for the past; now for the future. How shall St. Paul's be completed and adorned? This is an important question, which has been raised and partially answered by two writers in our impression to-day, one of them being "C. B. A.," before alluded to, and the other Mr. Basil Champneys, whose letter we have reproduced from the *Pall Mall*. The Committee having made a serious mistake are not likely to repeat it in a hurry. They have amongst them two men, Mr. Ferrey and Mr. Fergusson, who understand the matter as well as any two men in England, and we think they would act discreetly by listening most attentively to what these two men have to say.

#### THE MOORLAND CHURCHES OF DEVONSHIRE.

ON Friday evening last, Mr. J. Hine, F.R.I.B.A., gave a lecture at the Plymouth Institution, entitled "Notes, &c., on the Moorland Churches of Devonshire." The lecturer dealt chiefly with the churches on the eastern borders on Dartmoor. Their leading features were similar to those of the southern and western churches, modified by some local peculiarities. The universality of the styles and periods of architecture in Mediæval Christendom indicated a oneness alike of architecture and faith. There was then something akin to modern diversity in forms of worship, though there was one common creed underlying all. And so in architecture, all the churches spoke the same language, though different idioms were used. The best skilled workmen were engaged on the Cathedral at Exeter; and the influences of their work were to be seen throughout the diocese, and even in some of the Moorland churches, in the Norman and Early English periods. He found no traces, however, of this in the churches on the eastern borders of the Moor. The Norman and Early English builders of the Cathedral worked only in freestone; and left the granite to the Moorland builders, who did their best with that rough material. A peculiarity of these churches was a fifteenth-century doorway, made of four large stones—such doorways being found in several of the churches under review. Buckland Church was situated in one of the most beautiful sites in the county, and had a very interesting Decorated tower. North Bovey was a good Perpendicular church, and had a rood-screen in fair condition. The more elegant work in these churches was done by the carvers, who executed in wood what the masons were unable to realise in stone. What gave impressiveness to the Devonshire chancels was not their loftiness, nor the elevation of the altar—which was seldom raised above three steps—but the screen. The nave of North Bovey Church contained fine old fifteenth-century seating, comparing favourably in its massiveness and character with some even of the best modern work, which had commonly a thinness about it. There was some old painted glass in North Bovey Church. Manaton Church, the situation of which was nearly as fine as that of Buckland, was a hand-

some Perpendicular church, which showed no trace of an earlier foundation. The rood-screen was even finer than that of North Bovey, and still retained its original painting and gilding. The south porch was exceedingly handsome, with a parvise over. This was the best-built church in the border. In the churchyard was the base of an old cross. Chagford was in winter the dampest place on the Moor. The church was Perpendicular, as Manaton. It had no chancel arch, nor, indeed, had any of the churches described. Widdicombe Church, on account of its great size, and the beauty and position of the tower, was sometimes called the Cathedral of the Moor. The situation was exposed, but the valley of Widdicombe was one of the most beautiful in Devon, the church, with its noble tower, emphasising the beauties of the landscape. The church was Perpendicular, its extreme internal length being about 105ft. Mr. Hine described this fabric in considerable detail. The chancel had been recently restored by the Ecclesiastical Commissioners, but in such a way that some most interesting carved wall-plates had been destroyed.

#### IMPROVED SANITARY ARRANGEMENTS.

A SIMPLE method of filtering and purifying sewage has been patented by Messrs. Willett, Harris, and Lund, of Worthing, Sussex, and brought under our notice. The sewage matter is first received into a box of hoop iron, which strains off the rags, paper refuse, &c., after which it flows into a tank called a "subsiding tank," made on an improved principle; thence it passes through screens of cinder, which retain the heavier matter, and afterwards through other tanks variously arranged, till the required purity is attained, when it may be discharged into any river. The effluent is said to be colourless and inodorous, and fish are found to live in it. The cinders absorb the gases, and the process is recommended by the patentees for adoption by water companies, who may by its aid dispense with their own filtering processes, and draw their supplies direct. It is said to entail considerably less cost than any other means of treating liquid refuse, no machinery or chemicals being employed. The same patentees have brought out another appliance that may be even more usefully applied to supersede the wastefulness of dustbins, not always the most savoury receptacles in a basement. An earthenware vessel fitted with a galvanised iron pail is connected by a cast-iron pipe to the outside of the wall; it there supports an iron box or a sieve, into which the dust from grate is emptied, and by closing the lid and shaking a sifter fitted to the box the dust falls through the pipe for use in the closet. A valve regulates the delivery. The cinders thus sifted may be reused. It can, it is asserted, be applied to any floor.

#### CHIPS.

The Imperial party are much annoyed at Viollet-le-Duc, the distinguished French architect (though we believe in the opinion of Mr. W. Burgess, of England, he is no architect at all) offering himself as a Republican candidate for the municipal council of Paris.

New Board schools have been opened at Cefn, Flintshire. Messrs. Parnell and Son, of Rugby, are the builders, and Mr. Owen, of Liverpool, is the architect.

New Board schools, situated in Eagle-court, Clerkenwell, were opened on Saturday. Accommodation is afforded for 818 children. The building is of a plain character. The cost of the structure is put down at £7,000, or a total, including purchase of land, of £13,000. The architect is Mr. Robson.

It is said that in addition to the new sanatorium which Mr. Holloway is erecting at a cost of £100,000 at St. Ann's Heath, Virginia Water, he contemplates building a new University for ladies, at Egham. It is understood that the whole affair will cost £150,000. The new University is intended for high-class education for ladies, and will be administered on the University plan, and the founder intends it to be in every way "the handsomest college in Europe."

At the last meeting of the Wandsworth Board the plan submitted by the Vicar's architect, for the erection of a new mortuary in St. Mary's Churchyard, was accepted.

It has been decided to accept the tender (£23,540) of Mr. Easton Gibb, the contractor for the Lintrathen Waterworks, for the construction of the Chatto reservoir for the Dundee Waterworks.



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## ILLUSTRATIONS.

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## OUR LITHOGRAPHIC ILLUSTRATIONS.

## DESIGN FOR ENCAUSTIC TILES.

WE give another illustration this week from the series of designs for encaustic tiles made by Mr. Seddon, for Messrs. R. Minton Taylor and Co., of which we have before shown separate portions, only to a larger scale. On this occasion are represented two patterns with their appropriate borders, sufficiently developed to show the general designs. They would each require in execution three distinct colours, as chocolate or black, red and yellow, but could be made still richer in effect by the further introduction of white and blue, &c., in some portions, the first design, the hexagon in the principal feature, with smaller square ornaments introduced at the points of intersection of the larger, producing somewhat of the effect of a Turkish rug. The second design is more elaborate and complicated in its geometrical arrangement, resembling rather the Saracenic types, but both are worked out with conventional foliage and ornamental detail of an Early Mediæval character, so as to be suitable for introduction into modern Ecclesiastical decoration.

## ST. MICHAEL'S MOUNT, CORNWALL.

The buildings on St. Michael's Mount which form the residence consist of a large chapel 65ft. long by 19ft. wide; a dining-room, formerly the refectory, 32ft. by 15ft. 6in.; breakfast-room, 20ft. by 16ft.; drawing-room, 20ft. by 16ft.; small ditto, 16ft. by 11ft.; kitchen, 15ft. 6in. by 13ft. 6in.; guard-room, 14ft. by 13ft.; bedrooms, and other domestic offices. The accommodation will thus be seen to be most inadequate for the requirements of a gentleman's family. It has therefore been determined by Sir John St. Aubyn, the owner, to remedy this defect by erecting a new block of buildings at the south-east angle, giving the additional accommodation of two sitting-rooms of good size, respectively 34ft. by 20ft., and 24ft. by 19ft., together with twelve bedrooms and three dressing-rooms attached, and other domestic offices and appliances. In consequence of the limited space, and the precipitous character of the rocks, added to the fact that any buildings erected at the same elevation as those existing would be likely to interfere with their outline, and mar their singularly picturesque appearance and harmony with the rocks from whence they spring, the alternative of building entirely below the level of the existing buildings and under the courtyard has been forced upon the architect. The new works are shown in the front of the drawing, the older, rising above them form the background. The new work, like the old, will be built of granite. Owing to the peculiarities of the site, and the great height of the buildings above the level of the sea, the cost will be considerable. Other additional buildings are in contemplation on the north side, to be carried out at a future day. The plans have been made by Mr. J. P. St. Aubyn, and the works are being carried out under his direction by a resident clerk of works.

## DURHAM CATHEDRAL.—THE WESTERN TOWERS.

One of our illustrations is a reproduction of a sketch by Mr. Matthew Reed, jun., Newcastle-on-Tyne. The following is from Murray's "Handbook to the Cathedrals of England":—"The Norman work of these towers, of the same apparent date as the nave (there is no record of their construction), terminates at the height of the nave walls (above the clerestory). The upper stages, covered with arcades, alternately of pointed and circular arches, are Early English

still retaining some Transitional features. The parapet and turrets which now crown the towers were added in 1778. Until the year 1667 they had been capped by lofty spires of wood covered with lead." The accompanying sketch was taken from the Cloister Garth.

## ORREST BANK, ORPINGTON.

One of our illustrations this week represents Orrest Bank, a house just erected at Orpington for J. Woodhams Fox, Esq., from the drawings of Messrs. George and Vaughan. The walls are of red brick, the ground-floor being 18in. throughout, while the upper stories are of 9in. brickwork covered with weather tiles bedded in cement. The roofs are of red tiles, similar to those on the walls. The half-timbered gables are filled-in with brick in cement, and the plaster panels are relieved by devices drawn on the face. The builders were Messrs. Payne and Balding, of Bromley, Kent.

## BROMLEY COTTAGE HOSPITAL.

The Bromley Cottage Hospital (a view and plan of which we give in this number) is also by Messrs. George and Vaughan. The hospital provides eight beds for patients, a well-lighted surgery or operating-room, a sitting-room for convalescents, a bath-room, as well as matron's and nurses' rooms. There is also a dead-house specially arranged for *post-mortem* examinations. All the accommodation is obtained on the ground-floor, thus doing away with the necessity of stairs—the cause of so much trouble in the moving of invalids—for broken limbs are most frequent cases for treatment in these village hospitals. The rooms are ventilated through their ceilings into the high roof, and the impure air makes its exit from this space through louvres in the gables and dormers. The entrance, corridor, surgery, and kitchen are on the north side, the subject of our sketch, thus leaving the south and west aspects for the wards. On the south side is a raised terrace and verandah, entered from the convalescents' sitting-room. The building was taken in competition by Messrs. Payne and Balding, their contract price being £1,400.

## ELECTION OF DISTRICT SURVEYORS.

AT the meeting of the Metropolitan Board of Works on Friday last, the first business was to receive applications from candidates for the appointments of District Surveyors for the Southern Division of Islington and for the District of St. Mary, Stoke Newington, and to proceed to the election of the same.

For the District Surveyorship for the Southern Division of Islington there were 28 candidates, including Messrs. Thos. Blashill, H. H. Collins, Gould, Gundry, Lansdowne, Lovegrove, J. Douglass Mathews, Meeson, Piper, Rowland Plumbe, T. Roger Smith, T. Walker, and T. H. Watson. All the candidates having been voted upon once, all were dropped except the six who had received the highest number of votes, who were as follows: Messrs. Gundry, J. D. Mathews, Piper, Plumbe, Walker, and Watson. These having been voted for a second time, the numbers were as follows: Plumbe, 33; Mathews, 29; Gundry, 24; Piper, 20; Watson, 16; Walker, 15. Mr. Walker's name being dropped, the voting was taken a third time, with the following results: Plumbe, 32; Mathews, 24; Gundry, 23; Watson, 17; Piper, 15. Mr. Piper's name was dropped, and the fourth voting was as follows: Plumbe, 31; Mathews, 26; Gundry, 19; Watson, 19. There being a tie between Messrs. Gundry and Watson, the two candidates who had received the lowest number of votes this voting, the Board proceeded to vote as to which of the two names should be retained, when the result was as follows: Gundry, 25; Watson, 12. Mr. Watson's name having been dropped, the voting was taken on the three

remaining candidates with the following results: Plumbe, 32; Mathews, 20; Gundry, 18. Mr. Gundry's name having been dropped, the contest lay between Messrs. Plumbe and Mathews, and the final voting was as follows: Plumbe, 27; Mathews, 13. Mr. Rowland Plumbe was, therefore, declared to be duly elected District Surveyor for the Southern Division of Islington.

For the District Surveyorship of St. Mary, Stoke Newington, there were 20 candidates, including, besides most of those enumerated as candidates for South Islington, Messrs. Clarkson, Hansom, Willis, and others. As in the former case, all the candidates were voted upon singly, and all were dropped with the exception of the six who obtained the highest number of votes, viz., Messrs. Gundry, Mathews, Lansdowne, Piper, Walker, and Watson. On voting for these a second time the results were: Mathews, 25; Piper, 25; Gundry, 23; Watson, 22; Walker, 19; Lansdowne, 18. Mr. Lansdowne's name was then dropped, and the third voting was as follows: Gundry, 21; Watson, 21; Mathews, 20; Piper, 18; Walker, 17. Mr. Walker's name was then dropped, and the fourth voting taken with the following results: Gundry, 23; Mathews, 23; Piper, 16; Watson, 16. There being a tie between Messrs. Piper and Watson, the Board voted on the question which of the two should be retained, when the numbers were: Watson, 19; Piper, 16. Mr. Piper's name was accordingly dropped. The candidates were thus reduced to three, and the results of the fifth voting were: Mathews, 25; Gundry, 21; Watson, 12. Mr. Watson's name having been dropped, the contest rested between Messrs. Mathews and Gundry, and the result of the final voting was as follows: Mathews, 22; Gundry, 18. Mr. J. Douglass Mathews was therefore declared duly elected as District Surveyor for the District of St. Mary, Stoke Newington.

It is rather singular that in each of these contests there was a tie in the fourth voting, the tie being between Messrs. Gundry and Watson in the first case, and between Messrs. Piper and Watson in the second case. On the Board voting as to which of the names should be retained, Mr. Gundry's was retained in the first case, and Mr. Watson's in the second.

## CHIPS.

Mr. J. F. Bontems has been elected chairman of the British Land Company (Limited), in the place of the late Mr. Charles Gilpin, M.P.

The total cost of the new Town-Hall at Bolton has been £175,000.

The foundation-stone of a new parish-church, at Strabane, was laid on Tuesday last. Mr. John Kennedy is the architect, the cost will be about £4,500.

The parish-church of St. Thomas, Stambourne, was reopened on the 20th ultimo, by the Bishop of Rochester, after restoration by Messrs. Geo. Grimwood and Sons, builders, of Sudbury, under the superintendence of Gordon M. Hills Esq., architect, 12, John-street, Adelphi. The collection at the close of the service amounted to upwards of £50.

The Council of the Society of Arts will hold a conference in their rooms in the Adelphi, on Thursday the 10th December, on the steps to be taken to insure prompt and efficient measures for preventing the pollution of rivers, when the Right Hon. Lyon Playfair, C.B., M.P., F.R.S., will preside.

The marble work in the Grand Staircase of Rochdale New Town-hall, of which we gave an illustration last week, was executed by Messrs. H. Sibthorpe and Son, Dublin. The marble shafts to clustered columns, were of various colours, Red, Green, Maroon, Middleton, and Fossil. The handrail was of Moreen, a beautiful grey Irish marble.

A new mission chapel was opened at Crabtree, Devon, on Friday last. It is a plain Gothic structure built of local stone, with tuck-point joints of Portland cement. It is constructed to seat 180 persons, and for school purposes will accommodate 200 children. The architect was Mr. Clifton, of Devonport, and Mr. Hosking, of St. Budeaux, the contractor. The cost is about £700.

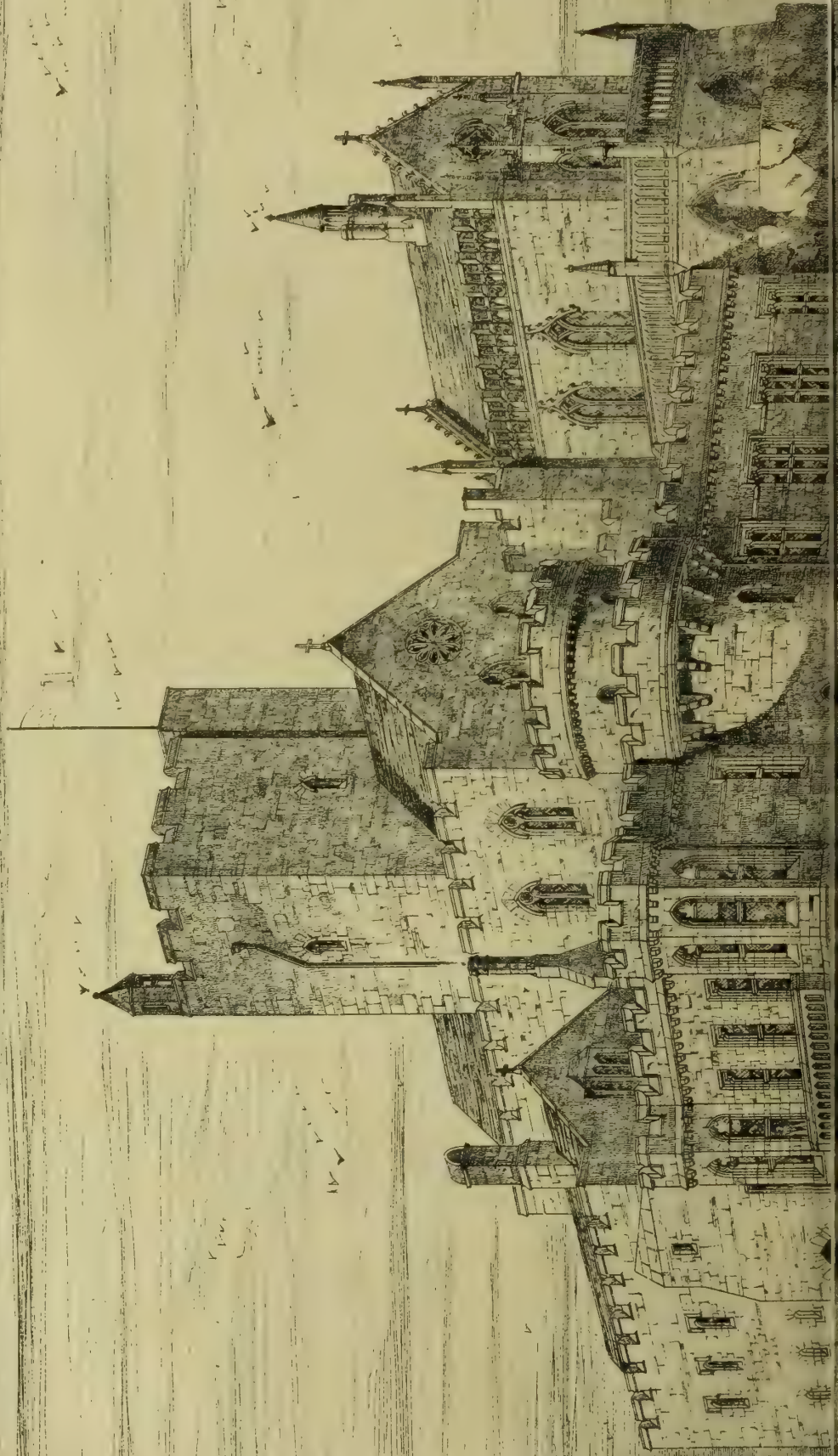
A new Masonic Hall has been erected at Thirsk, at a cost of £900, from designs by Mr. W. A. Bourne, of Thirsk and Ripon, architect.



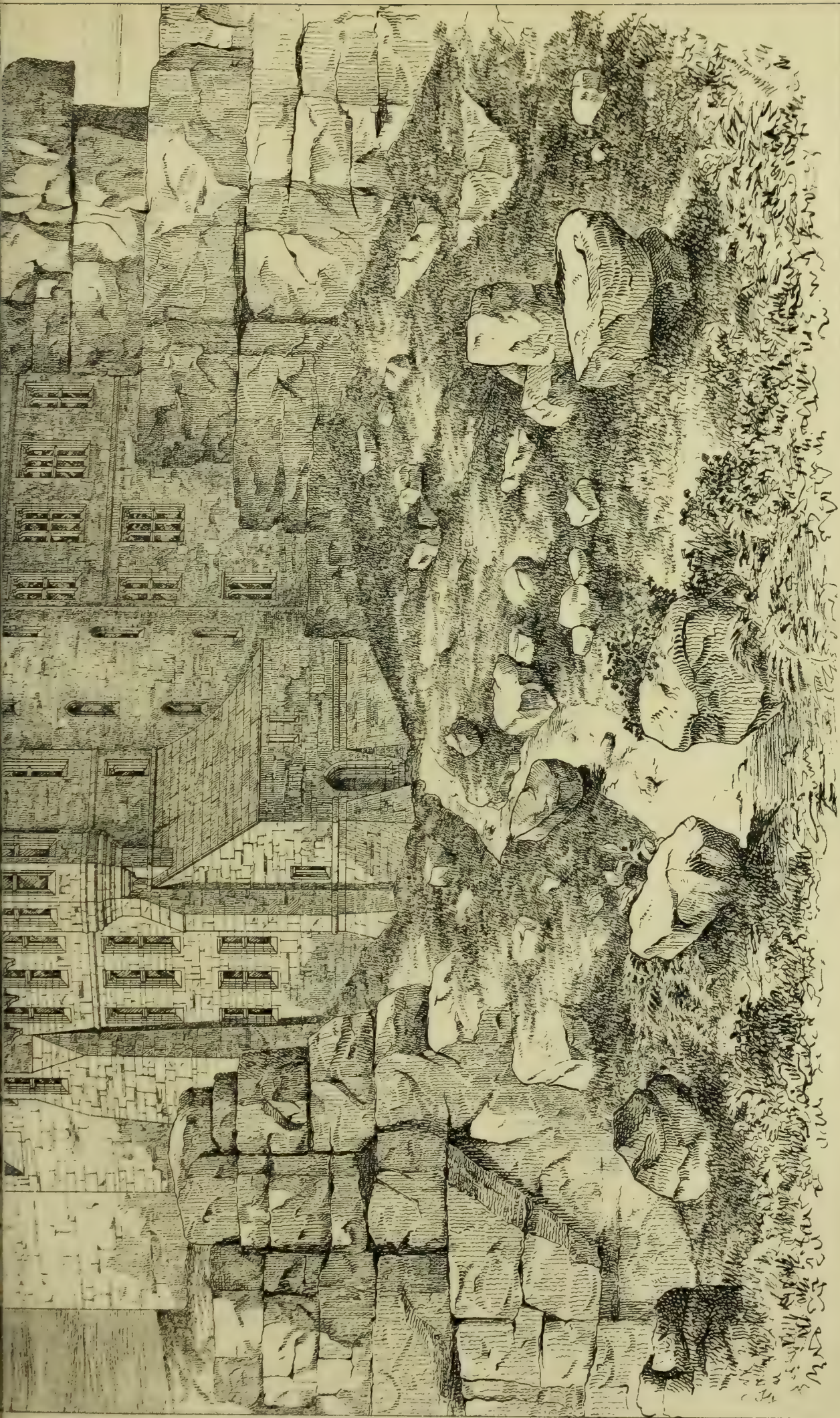




THE BUILDING NEWS, Nov. 20. 1874.







*ST. MICHAEL'S MOUNT: CORNWALL: restoration and additions: J. P. S. Aubyn-Archd.*

Photo Lithographed & Printed by James Alkman St. George's Lane Road W.C.

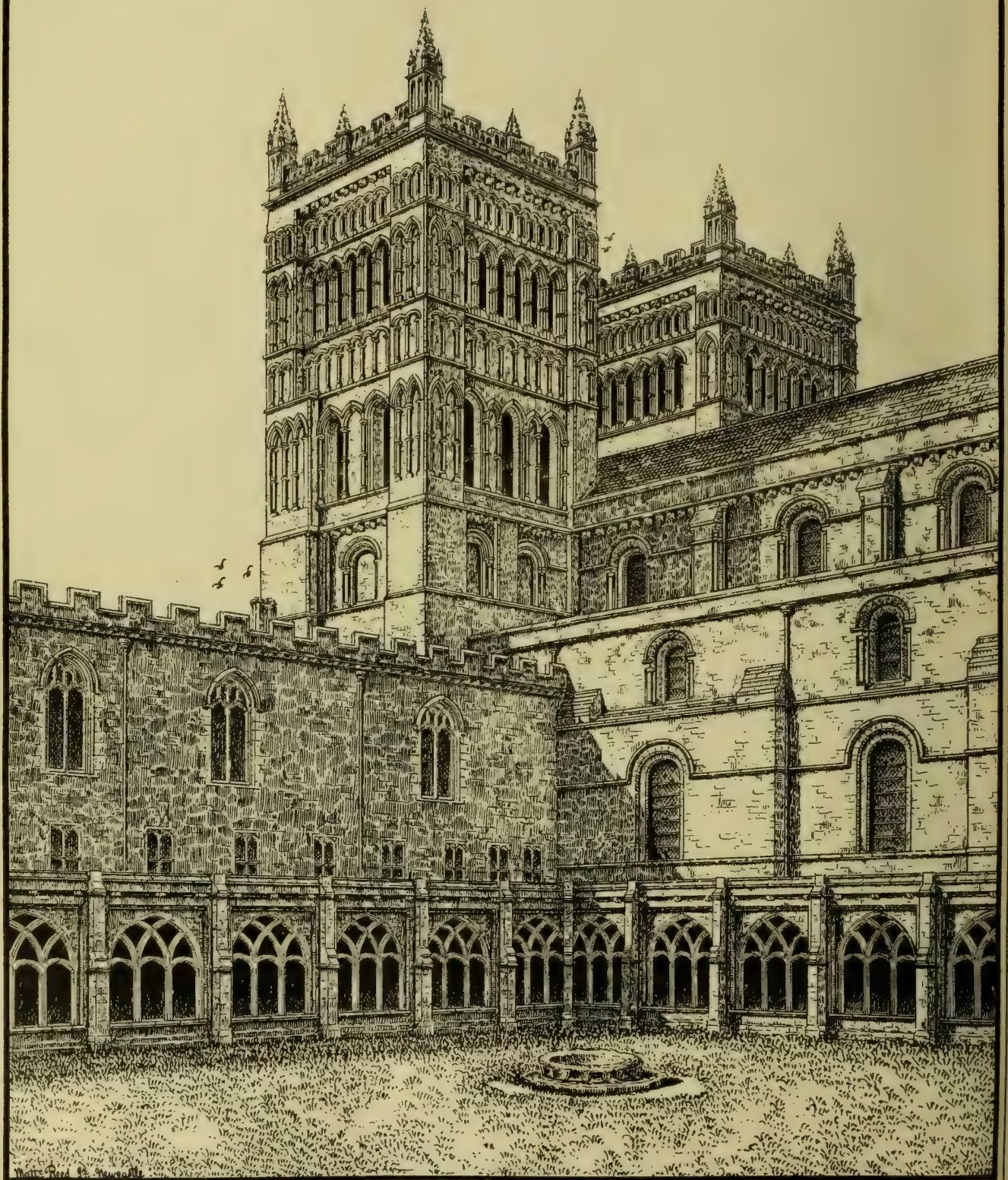










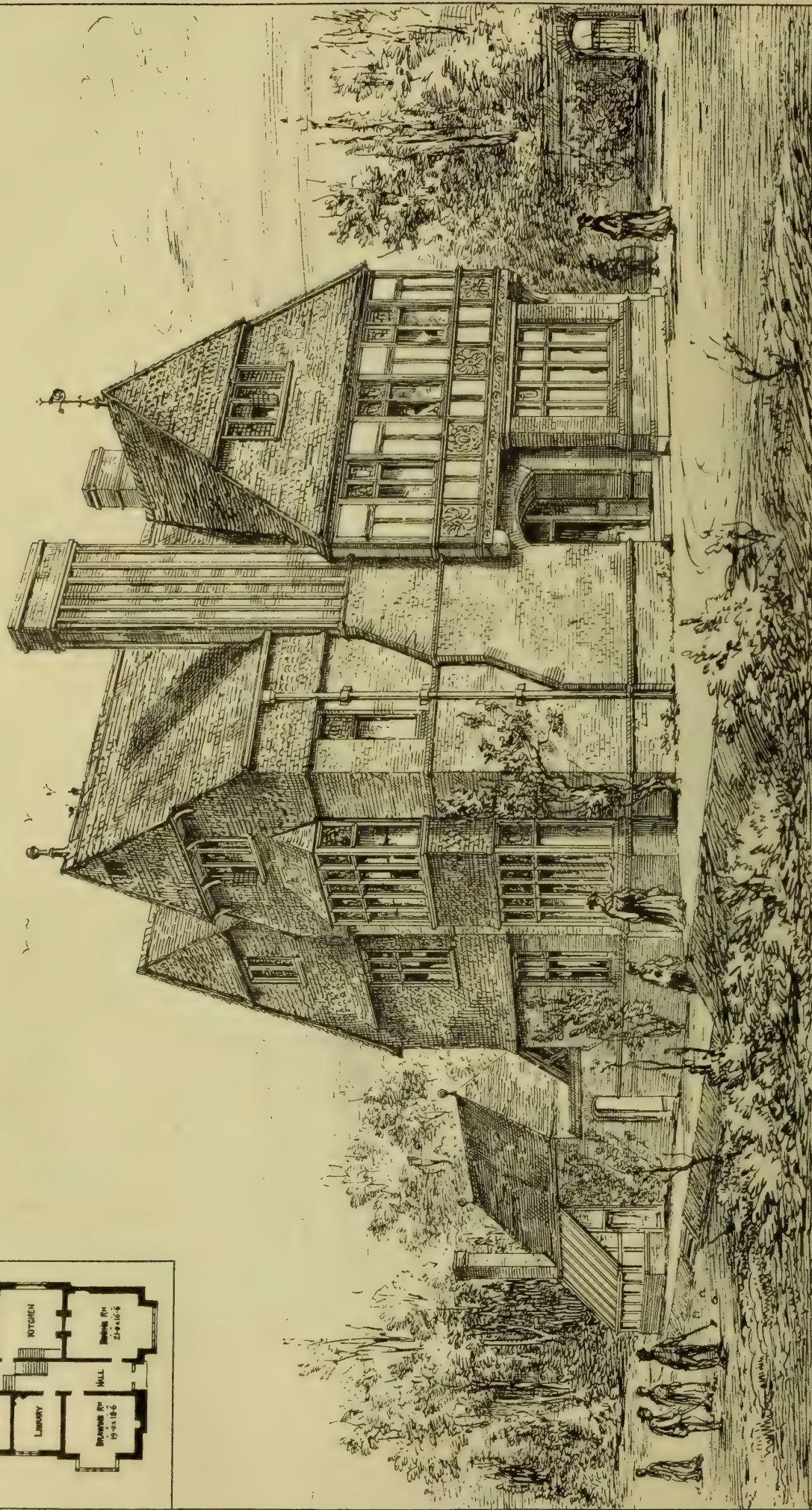
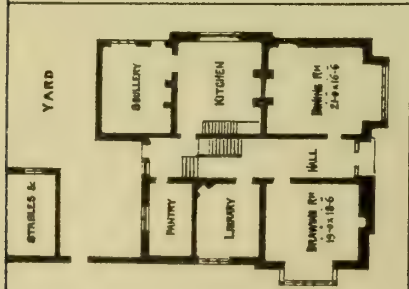


THE WESTERN TOWERS OF DURHAM CATHEDRAL. VIEW FROM THE CLOISTER.









ORREST BANK, ORPINGTON, FOR J.W.FOX ESQ<sup>RE</sup>.

GEORGE & VAUGHAN, ARCHTS.  
11 ARGYLL ST. W.

Photo. Engraved & Printed by James Atkinson St. George's Lane Road W.C.





COTTAGE HOSPITAL BROMLEY, KENT

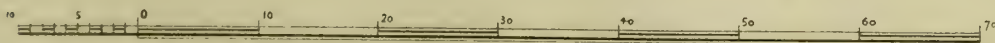
GEORGE & VAUGHAN ARCHTS  
11 ARGYLL ST. W.

PERSPECTIVE VIEW



GROUND PLAN

SCALE OF FEET









DESIGN FOR ENCAUSTIC TILES FOR R MINTON TAYLOR & CO

BY  
J. P. SEDDON ARCHT.



SCALE OF 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 INCHES









## ROYAL INSTITUTE OF BRITISH ARCHITECTS.

AT the second ordinary general meeting of this Institute for the present session, held on Monday evening last at 9, Conduit-street, Mr. John Gibson, V.P., in the chair, Mr. Colville Browne, of Long Melford, Suffolk, and Mr. William James Martin, of 56, London-street, Reading, were ballotted for and duly elected as Associates. Several donations and purchases of books for the library were announced, and the Chairman announced the decease of Mr. G. E. Laing, Fellow, and of the Cavaliere Antonio Cipolla, Hon. and Corresponding Member.

Mr. J. MACVICAR ANDERSON, Fellow, then read a paper (of which the following is an abstract), on

## THE ORWELL PARK OBSERVATORY.

The designing of an observatory is a work of considerable interest, calling for the exercise of much care and ingenuity, especially when, as was the case at Orwell-park, the observatory has to be so connected with an existing edifice as to admit of facility of access, and to combine with the somewhat complicated domestic arrangements of a country mansion, and yet be so isolated as to secure complete privacy and perfect quiet to the astronomical observer. The observatory, however, forms only a portion of the works which Mr. Anderson was called upon to design at the same time in connection with the house at Orwell Park. The original house consisted of a square block, to which had, at various times, been added several adjuncts, such as the picture-gallery, billiard-room, and conservatory to the west, and an entirely new wing to the east, embracing the whole of the domestic offices; and beyond that again, the stable offices, brewhouse, laundry offices, &c. In connection with these additions, the main block of the mansion had, so far as the south front is concerned, been refaced, and made to assume the architectural garb it now possesses. These operations had, at different periods, been carried out by the late Mr. Burn. Such was the subject for treatment by Mr. Anderson. The requirements of the proprietor were:—one or two suites of first-class bedrooms, in which the house was deemed to be deficient, forming state apartments; a Turkish bath; and last, not least, an observatory, with some minor and subsidiary wants. The main building, comprising the principal apartments, was complete in itself, and answered every purpose required of it. It was clear, therefore, that neither one nor the other could be materially altered without disturbing arrangements which were good, and incurring a large and unnecessary outlay. Accordingly, Mr. Anderson adopted an arrangement which retained the whole of the existing buildings intact, with some unimportant exceptions, while it extended to more than double its then length the principal architectural front of the building, and obviated the inconvenience of the servants' offices overlooking the private grounds. This was done by building up the whole of the windows of the offices which looked to the south, and lighting and ventilating such offices from the roof. The whole of the space to the south of the east wing was thus made available for the erection of an entirely new wing, comprising the additional accommodation required, shutting out from view the ugly and unfinished appearance of the old east wing, and completing the architectural facade of the building to the south. This new wing consisted of a suite of apartments on each floor, so arranged that the rooms might be used together or separately, as occasion required, and accessible on each floor by means of a corridor 170ft. in length, in connection with which was provided a new principal staircase, much needed. At the extreme easterly end of this new wing, Mr. Anderson placed the observatory, thereby providing convenient access to it from either floor by means of the corridors mentioned, and at the same time securing that complete isolation which the peculiar circumstances of the case called for. The rooms on the principal floor were so arranged that they might be used as a complete suite of family apartments, the proprietor's business room being at the east end of the suite, in close proximity to which, but properly shut off, were the Turkish bath chambers, and in immediate communication with which was the observatory above, by means

of a private staircase. While there is no building which calls for more anxious thought and more careful attention to every detail on the part of the architect to whose care it is confided than an observatory, on the other hand, there is perhaps no subject the peculiar properties of which lend themselves so little to the production of a good architectural effect—so much so, that it has been doubted by Gwilt whether it is possible to combine such features with beauty of design. When it is considered that the dome of an observatory intended for an equatorial instrument, such as the one at Orwell Park, must be made to revolve, must have a movable shutter, and must be finished without any lantern or spiral termination, it will be seen that such doubt did not arise without reason. The first point of primary importance that demands attention in the construction of such a building is the site. In the case of Orwell Park this did not admit of much choice, inasmuch as the observatory was required to form part of the mansion. As a rule, the best position for an observatory is the summit of a low hill or rising ground, so as to command the horizon without entailing the expense and involving the difficulties which attend the construction of a lofty edifice. At Orwell Park, the observatory, although standing on high ground, had necessarily to be of considerable height, in order to surmount the adjacent buildings and the lofty trees in the vicinity. It was stipulated by Mr. Airy, the engineer who designed the scientific and mechanical portions of the work, that the floor of the equatorial room should be 6ft. above the top of the highest chimney in the mansion adjoining—a stipulation which involved a height of 53ft. from the ground level, and of 72ft. to the top of the dome, the total height from the bed of the foundations to the top of the dome being 86ft. When an observatory is erected in the vicinity of a river, it should be placed at such an elevation as to be above the reach of fogs, for such may prevail when the sky above is clear and well adapted for astronomical observations. Mr. Airy said he had frequently seen a dense fog extending as high as 100ft. above the Thames at Greenwich, while at the Royal Observatory, 150ft. above the river, the air was perfectly clear and the stars brilliant. The next point of primary importance is the nature of the foundation—not so much on account of the actual weight of superstructure (although at Orwell Park that was very considerable) as on account of the absolute necessity of securing a basis perfectly immovable, beyond all fear of settlement, and above all, free from any chance of vibration. The nature of the foundation at Orwell Park was a hard loamy sand, which was so firm that Mr. Anderson did not deem it necessary to resort to any artificial foundation, but bedded the footings of the general buildings at once upon the sand. In the case of the observatory, however, where the excavations had to be carried to a considerably greater depth, there were occasional soft places, with water. The soil in such places was removed, and the holes filled in with concrete, and in addition to this, the whole observatory building was placed upon one solid bed of concrete, 4ft. in thickness, and extending 30in. beyond the lower course of the footings. The only possible objection that might be urged against this plan is that the concrete being in one mass, upon which both the outer walls and the central pier of the observatory stand, might act as a conductor of tremor or vibration from the outer shell to the kernel which it inclosed. This, however, was considered remote in the case of Orwell Park, and the result is said to justify that conclusion. Were the central pier, however, made to stand upon a foundation separate from that of the building which incloses it, and consisting, say, of piles driven deep into the surface of the earth, there would be less risk of the pier being affected, even to the remotest extent, by vibration, and in theory, therefore, such a foundation would be the most perfect. Next in importance, and second only to the foundation upon which it stands, comes the pier or pillar which constitutes the heart of the structure, being the support of the instrument in the observatory above. The difficulty in obtaining a secure support for the instrument, perfectly free from vibration, increases proportionately with the height to which it is carried; and it might possibly be better, in some cases where the height is exceptionally great, or where it might facilitate the planning of the lower portions of the building, to introduce more than one support, thereby leaving a clear space beneath uninterrupted by any central shaft. In the case of Orwell Park

Mr. Airy stipulated that the instrument should be supported upon one central pier or pillar, circular on plan, and carried up from the foundation to the height of 60ft. in one solid and unbroken mass of brickwork. At the base, and for a height of 12ft., this pier was 10ft. in diameter; from this point to the height of 32ft. it was 8ft. in diameter; and for the remaining 16ft. it was 6ft. in diameter. Of course the brickwork of this pier was of the very best description, but it was, by Mr. Airy's special desire, built in mortar, not in cement, the former material being less subject to expansion; the work was carried up slowly, so as to allow it to set thoroughly throughout the entire mass of the column. At the level of 7ft. from the top of the pier, a 12in. hard Yorkstone, 6ft. in diameter, was inserted, and on the top of the pier a similar stone was bedded to form the upper surface of the column, at the exact level of 3ft. 10in. below the floor of the equatorial room, and to this stone was afterwards fixed the iron casting which formed the support to the instrument. The one point of supreme importance which required to be specially attended to in connection with this pier was that it should have absolutely no contact whatever with any portion of the surrounding building from the foundation upwards—just, indeed, as if it had stood by itself, an isolated pillar. To effect this object Mr. Anderson incased the pier with a circular wall of 14in. brickwork the whole height from the foundation upwards to the floor of the observatory, leaving a clear space of 6in. throughout between the outer surface of the pier and the inner surface of the inclosing wall, and thus it became utterly impossible that the pier could be, even to the smallest extent, affected by its proximity to the surrounding buildings. The diameter of this circular well, as it might be called, was made to diminish upwards, following the diminishing diameter of the pier which it incased, so as not to lose space in the surrounding building. The internal diameter of the dome of the observatory was fixed by Mr. Airy at 20ft. in the clear, and the circular walls which supported it and formed the equatorial room were consequently required to inclose a space 19ft. 6in. in diameter. It is obvious that, had these walls been carried up from the foundations, the space between them and the 14in. wall inclosing the pier would, especially towards the bottom, have been so limited as to have been practically useless. On the lower floors, therefore, Mr. Anderson constructed the building of a much larger diameter, and of an octagonal form, measuring 32ft. from out to out. By this means he obtained a space all round the central pier 7ft. 6in. in the clear between the external walls and the 14in. inclosing wall already alluded to. This space in the principal floor seemed well adapted for the Turkish bath. Mr. Anderson therefore formed an adjunct to the observatory building on this floor, and placed therein the *sudarium* and *tepidarium*, reserving the whole of the space surrounding the central pier of the observatory for the *frigidarium*. These chambers were heated by a special furnace placed in the basement immediately beneath. The cooling chamber was so fitted up and furnished as to be available as a sumptuous and agreeable lounge for general purposes, as well as for the more immediate requirements of the Turkish bath. The space on the first floor, immediately above, was occupied as a muniment chamber, arched over, as well as the chamber beneath, with brickwork in cement. On the floor above this muniment chamber the circular external walls of the observatory proper commence. These, however, were not in any way supported on the brick arches just referred to, but upon a series of sixteen wrought iron girders, resting at one end on the external walls of the octagon below, and at the other on the 14in. wall inclosing the central pier, overlapping the latter inwards, so as to form the support to the diminished diameter of the 14in. inclosing wall above, and receiving about midway between the bearings the circular wall of the observatory. At this level, the space is occupied by a belvedere, accessible by means of the spiral stone stair leading to the equatorial room above, and from which might be obtained good views of the surrounding scenery. For this purpose the walls of the observatory were on this floor pierced with a series of arches, and the junction architecturally between this circular building and the larger octagonal one below was formed with large scrolls or trusses of moulded and carved masonry, one being placed over each angle of the octagon. The observatory, or equa-



torial room, was reached by means of the spiral stair already alluded to, at the top of which was a door 6ft. high by 2ft. 6in. wide, the height of the door being restricted in consequence of Mr. Airy's stipulation that the extreme top of the observatory wall should be exactly 6ft. 5in. above the level of the floor. The observatory was circular on plan, 19ft. 6in. in diameter in clear of the walls, which were 22½in. in thickness. It was lighted by means of small circular-headed windows in the walls forming incurves externally, the apex of which did not rise above the stipulated height of 6ft. 5in. from the floor. Corresponding with the doorway from the circular stair was another and similar doorway leading to the transit chamber, a small room prepared for the reception of the transit instrument. In the floor of this chamber, a hard York stone, 5ft. by 3ft., was fixed, forming the foundation for the transit instrument. It was stipulated that this chamber should be upon a certain axis, which condition Mr. Anderson was fortunate in securing by placing it on the north-east side of the observatory, corresponding to the stair-turret on the north-west side, in which positions they were less prominent than they would have been elsewhere. These projections or turrets it was difficult to make architecturally effective, in consequence, firstly, of their destroying the circular outline of the observatory, and, secondly, of the necessity of keeping them beneath the top of the general line of masonry, and finishing them with flat roofs. The chief constructive feature of an equatorial room is the dome, which must be made to revolve, and that with the greatest ease. There are different methods of effecting this object, but in the case of Orwell Park, the dome, which weighs about 3 tons, revolves upon a series of wheels contained in boxes formed in the masonry for the purpose, the motive action being by means of a grooved wheel and endless rope, which, acting on a circular rack on the top of the wall, caused the dome to revolve with great ease. The wheel-boxes are sixteen in number, formed in the top course of the masonry, and constructed with a stone in front of each, bolted and made removable at pleasure in case of the boxes becoming choked. The dome was constructed of iron ribs 4in. thick, covered on the outside with deal boarding to receive the copper sheathing which formed the external covering, and lined on the inside with polished mahogany boards, with joints radiating towards the apex. The dome was provided with a shutter, which was so contrived as to open easily and yet be perfectly weathertight when closed, and which extended from the base to the apex, forming a complete slit when open on one side of the dome. Mr. Anderson concluded with some general remarks, in the course of which he referred to the harmonious manner in which Mr. Airy and himself had worked together, to the great advantage of their mutual employer.

Mr. W. Airy, C.E., having given a few particulars as to the mounting of telescopes, &c., a few remarks were made by Messrs. Talmage, Penrose, Edward Hall, Ebdy, and Thomas Morris, and the meeting terminated with the usual vote of thanks to Messrs. Anderson and Airy.

The next meeting will be held on Monday, November 30, when a discussion will take place upon Mr. T. H. Eagles's essay on "Vaulting," read last session.

#### INSTITUTION OF SURVEYORS.

THE first ordinary general meeting for session 1874-75 was held on Monday evening last at the rooms of the Institution, No. 12, Great George-street, Westminster. Messrs. Isaac and John Holden, of Manchester, were ballotted for and duly elected as Members of the Institution.

#### THE PRESIDENT'S ADDRESS.

MR. THOMAS HUSKINSON, the President, then proceeded to deliver his inaugural address, of which the following is an abstract:—After some congratulatory observations on the great success with which the Institution had met, in the course of which he remarked that the Institution was gradually attracting to itself the confidence and support of all who were desirous of raising the status of the profession, he proceeded to consider briefly the present position of English agriculture, and some of the causes which have influenced that position. He remarked that English farming worthy of the name had but a short history, for it had risen from a condition which, by comparison with the present, might be called

barbarism, within a period of little more than a century. At that time a large area of the country was uninclosed, and subject to rights of common and restraints of culture which precluded all improvement. M. Laverne, in his admirable work on the rural economy of England, Ireland, and Scotland, concludes an elaborate comparison between the agriculture of this country and that of France, in these words: "A comparative examination of agricultural products, the number of the population, and the value of the land, all combine to prove, upon the most moderate estimates, that previously to 1848 the product of British agriculture, if we compare England alone with the whole of France, the former produced twice as much as the latter." Mr. Huskinson said he quoted this testimony for the double purpose of confirming the statement he had made, and also because France had pursued with regard to the organisation and distribution of her land a course entirely opposite to that which had obtained in this country. France had no law of primogeniture, and only a limited power of testamentary disposition. The law compelled a division of estate on the death of the owner. The effect had been a minute subdivision of landed property and the creation of peasant proprietors, and after an operation of eighty years the result was as quoted. M. Laverne and other competent judges were of opinion that the subdivision of land in France had reached a point which threatened serious evils, and tended to retard the progress of the country. In two generations the division of property in France had reached, in special cases, less than the fiftieth part of an acre, and whole communes were now subdivided into estates of less than six acres. The great development of trade which occurred about 1770, consequent on the discovery of coal, had an important effect on agriculture. It created a demand for labour and for the produce of the land which in the then state of agriculture could not easily be met. It called attention to the restrictions and discouragements to improvements imposed by the system of Common Fields and Common Rights which then extensively prevailed, and with true practical sagacity our forefathers applied voluntarily to Parliament for power to convert the common lands into severalty, and to extinguish common rights, and in very many cases tithes also, and thus laid the foundation of our modern system of agriculture, and conferred an enormous benefit upon the nation. Those who would have a clear view of the condition of the England of that day should carefully examine for themselves the condition of land tenure, both as respects ownership and occupation, which then existed. It was deeply interesting in many ways. It was tolerably certain that the state of our commons and open fields as then existing had undergone no change for many centuries. They were very much under the same conditions of tenure which had existed among the Teutonic tribes, and spread by them over Western Europe after the disruption of the Roman Empire, and which still prevail in many parts of the Continent. It was more than probable that this same system was even of much greater antiquity; for the interesting researches of Sir Henry Maine, published in his "Village Communities of the East and West," show that the Teutonic Mark has too many points of resemblance with the Indian village communities to be the result of mere coincidence, but point to a common origin. To understand the difficulties under which cultivation was then carried on, the parish of Epperstone, a typical example of a large number of parishes in the Midland Counties, was referred to by Mr. Huskinson. That parish contained 2,320 acres; it was inclosed in 1768. The village stands near the southern boundary of the parish, surrounded by small homesteads, the meadows by the village stream, the arable fields (three in number) in different and distant parts of the parish, in each of which every owner had one or more plots. The commons for pasturage were distant from the village, and the woodlands, affording pasturage, fuel, and wood for repairs, were on the boundary of the parish. The allotments in the arable fields did not average half an acre each, and a single farm neither better nor worse than the rest contained 70 acres in 146 plots. The arable fields were held in severalty till the crops were carried, and were then subject to common right; the meadows were held in severalty till the hay was cut and then open to common right. The common pasture was common all the year, and here the cows of the parish were milked, more than a mile from the

homesteads, and along a road which was not passable for horses and carriages in winter, and not very commodious in summer. No buildings could be erected on any part of the parish, except in the village homesteads, on account of common right. All the produce had to be carted along unmetalled roads, and all the men and horses in carrying on their daily labour had to pass great distances to and from the land. No turnips could be grown upon the arable land for winter food, no artificial grasses for pasturage. It is not too much to say that if these conditions existed now a considerable part of the parish would yield very little rent, and others would be scarcely worth cultivation. The same parish is now occupied in nine farms in consolidated areas, with houses and premises in central positions, yielding an average rent of 33s. per acre, and a produce at least fourfold greater than it could have done prior to inclosure. In this neighbourhood more than 40,000 acres were inclosed between 1765 and 1795, the rights of common and usages of culture being in every case the same. Considering the prejudice which had lately been excited in the public mind with reference to inclosure, it was important to note that in none of the cases mentioned, nor in any other cases of rural inclosure with which the author had been connected, had he ever known a case where a right of common belonged to any person who was not an owner of house and land in the parish. There was no such thing as a right to turn on a cow or pig or even a goose, except in connection with land, and for all such rights every owner, however small, was fully compensated, and compensated by an allotment in the land itself. It should be remembered, too, that the whole transaction was voluntary, not enforced by the Legislature, but sought for by the landowners, and that they themselves selected the commissioners who were to decide upon their claims. It had, however, been stated that millions of acres of waste land had been inclosed upon which the poor had rights that were never compensated, and of which they had been defrauded. Those who had to deal with inclosures knew that this was a pure fiction—indeed, that such a thing was impossible, and that it had no foundation in truth. Considering the many and undoubted benefits which the inclosure of commons and open fields had conferred upon the country—benefits so unquestionable that they were acknowledged by every person conversant with the subject—it was remarkable how easily prejudice could be created when arguments were tintured (perhaps unconsciously) by personal interests or political views. A case of this kind occurred with reference to the inclosure of the commons and commonable lands surrounding the town of Nottingham. The opposition to inclosure was so persistent that it succeeded in delaying the inclosure for more than half a century after the increasing population of the town urgently required increased building space. The common lands, about 1100 acres in extent, surrounded the town, and extension of building had become impossible, while the pressure of the population was so dense that in parts of the town from 500 to 600 persons lived upon an acre of ground. The freemen of Nottingham claimed the rights of pasturage during portions of the year, and the landowners held considerable portions in severalty for the rest of the year. The value of the freemen's right and pasturage was not worth more than £150 a year, and the land itself, while subject to these rights, was not worth to the landowners more than £100 per acre. After many attempts at inclosure had been made and failed, Mr. Hawksley made a report to the Health of Towns Commission which attracted much attention, and created a strong public feeling in favour of inclosure; the landowners succeeded in obtaining a Bill for Inclosure, and in 1851 the allotments were made free from all common rights. The result, after twenty-three years, is that a large proportion of the land has been covered with houses and manufactories. The land, before inclosure worth only £100 per acre, has been sold by the yard at prices varying from 2s. to £1, and probably averaging 6s. per yard. The freemen, whose income from the pasturage was not worth more than £150 a year, had an estate allotted to them after inclosure, which now produces £3,700 a year, and as great part of this was from leasehold ground rents, it would in future be much greater. The town of Nottingham received allotments for an arboretum, for public walks, recreation and cricket grounds, of over 100 acres, and the general benefit to the town in health and wealth



was hardly calculable. Following the great inclosures in rural districts which changed the whole state of agriculture, and gave to it a new life, came the opportunity to put farming on an economical basis. Houses and buildings, before separated from the land, could be erected in the centres of consolidated and enlarged holdings, the cultivation of roots and rotation of crops freed from restriction, and the land adapted for the use of improved implements and machinery, which prior to Inclosure would have been of little avail. The outlay upon these works was very great, but property being mainly in the hands of wealthy owners, it could be provided. The introduction and cultivation of turnips by Lord Townsend, in the time of George II., had been attended with great success, and these roots had since become the basis upon which the rearing and fattening of stock were founded, and had given fertility and value to all the light soils of the country. Mr. Huskinson having remarked that he attributed the great development of English agriculture in recent times in no small degree to the existence of large estates, which, as a rule, presented the best examples of management, and had generally led the way in all improvements, he observed that the last cause of our agricultural prosperity was the intelligence and practical skill of our best farmers. Of course there was much farming that was capable of great improvement, but such defective farming was not inherent to the present system of land tenure. Adverting to some topics on which it was to be hoped some information would be forthcoming at the meetings of the Institution during the ensuing session, Mr. Huskinson said that what was greatly needed was a full and impartial history of the land, concerning which the most absolute ignorance prevailed. Mr. Mill and others had asserted that the number of landowners in England did not exceed 30,000. This, however, had been discovered to be an error, and was a singular instance of the careless reading of statistics even by distinguished writers. Mr. Disraeli stated in 1850 that in the United Kingdom it was reckoned that there were 250,000 landed proprietors; and considering the gross misconceptions, prejudices, and misrepresentations which were widely diffused and credited by intelligent people with reference to land and its supposed concentration in the hands of a small class, it was most desirable that the facts should be authoritatively ascertained.\* In conclusion, Mr. Huskinson referred to the prospects of the session, during which, he said, there would be a paper on the Agricultural Geology of the Western Districts of England, by Mr. Sturge, which would be followed by a discussion on the landlord and tenant question. A paper on the important subject of riparian rights was also promised, and the rating of mansion-houses would form the subject of another paper.

On the motion of Mr. Woolley, seconded by Mr. T. Chatfield Clarke, a vote of thanks was given to the President for his address; and the President having replied to a few remarks which had fallen from Mr. Chatfield Clarke, the meeting terminated. The next meeting of the Institution will be held on Monday, December 7, when a paper on the Agricultural Geology of the Western Counties will be read by Mr. Sturge, of Bristol.

#### COMBINATION BRIDGES FOR RAILROADS.†

IN advocating the adaptability and economy of the use of Combination Bridges on railways, the writer has been frequently met by the assertion of two objectionable features.

First.—That the difference of expansion from change of temperature in wood and iron causes such a serious loss of camber in hot weather that the bridge is in danger of falling below the horizontal line.

Second.—That the difference in cost between a bridge entirely constructed of iron and one of wood and iron combined is not sufficient to warrant the sacrifice of permanency due the iron structure.

Convinced by some experience of the practical economy and efficiency of combination bridges, the author has been led to examine the ground on which these alleged objections rest.

In regard to the first—the loss of camber—it is

\* We beg to intimate that this is an essentially one-sided statement of the question, and that it admits of a triumphant reply.—Ed. B. N.

† By J. O. PATTERSON, C.E. in *Van Nostrand's Magazine*.

obvious that the expansion or contraction of the web members of a truss cannot affect the camber, except to the infinitesimal extent due the changes of depth of truss from that cause. Therefore we have only to consider the elongation of the bottom chord as tending to allow the bridge to sag. A moment's consideration of the nature of a truss shows this to be true. We have two chords taking the horizontal stresses and a system of triangles which take the place of the web of a solid girder, transmit the shearing stress to the abutments, and maintain the chords fixed in the same relative position. Now, if we increase the length of one of these chords, or rather spread each of the triangles of the web a little at the top, we force the truss to take a curved form; because, the long chord being prevented by the web from sliding on the short one, they necessarily become parts of concentric circles, thus compensating for their difference of length. In a parabolic truss the want of parallelism in the chords does not affect the principle, but the increase of length in each panel would not be uniform but proportional to the depth of truss. Between 8,000 and 9,000ft. is the ordinary radius of the camber curve.

In order to ascertain the amount of variation of length which is likely to occur in the bottom chord, we will assume 150deg. (i.e. from -30deg. to +120deg.) to be the maximum range of temperature for the section of country most actively engaged in the construction of railroads.

The expansion of wrought iron due 150deg. increase of heat as given in the textbooks would equal 0.001 of the length of any bar of that material, but it is but fair to suppose that the drilling of the eye bars of a bridge chord (which determines their length) is done with the body of the bars at an average temperature of, say 60deg., therefore it is not the extreme variation of temperature which should determine the loss of camber, but the difference between that at which the bars are formed and the maximum.

However, as the top wooden chord is shortened by stress to a small extent, in the following calculations, we will consider the maximum range of 0.001, the length as affecting the bridge.

Taking, for example, a truss of 199ft. 6in. clear span, and 24ft. deep, say 14 panels of 14ft. 3in. each on the Howe plan, with a camber of 7in. Each panel of the top chord would be increased in length 6-10ths of an inch, and as there are 12 panels (the end posts and counter being omitted) the total increase in length of upper chord would be 7.2in. The greatest possible longitudinal expansion of the lower chord equal 199ft. 6in.  $\times$  0.001 equal 237-100in. — 7.2in. — 2.37in equal 4.83in. equal 4.8in. camber remaining in bridge. The deflection under full moving load should be between 1.1in. and 1.2in., consequently there will remain 3.4in. crown in the truss under the most unfavourable circumstances, which is certainly an ample margin for safety. As the camber and deflection are both proportionate to the span, there would be a proportionate margin in any length of truss.

The contraction of the chord in winter would simply have an opposite effect—increased camber; and while the bridge does not drop below the horizontal line and one end is free to move, can cause no excessive stress.

As regards the second objection, it seems to me that so long as the interest on the excess of cost of an iron over a combination bridge remains more than sufficient to pay for renewals of the latter, the former remains the most costly; or, to state it more conveniently, let  $c$  equal first cost of combination bridge, and  $x$  equal same for iron bridge,  $r$  cost of renewal in percentage per annum on first cost, and  $r'$  equal legal or average rate of interest. Then we will say an iron bridge

will only be economical when  $x < \frac{C(r' + r)}{r}$ . In

this case the greater original cost of the iron bridge may fairly be said to offset the inconvenience of the periodic renewals of the combination. As an example, compare the cost of trusses 160ft. in length, constructed on the two systems.

Such a bridge, on combination plan, with timber planed to facilitate painting, and top chords housed or covered, can be built by any reliable firm, at present prices of material, for 40dols. per lineal foot.

We will suppose, to be on the side of safety, that the bridge will only be reliable for 10 years. An iron bridge by the same builder would not cost less than 70dols. per lineal foot—*vide* bids on the 25 Erie Railway bridges. The two trusses will then stand as follows:—

	IRON.	Dols.
First cost .....		11,200
Interest 10 years at 6 per cent .....		6,720
Total cost at end of 10 years.....		17,920
	COMBINATION.	Dols.
First cost .....		6,400
Interest 10 years at 6 per cent .....		3,840
32,000ft. beam pine timber for renewals at 25dols. ....		800
Labour on renewals at 5dols. per foot .....		800
Total cost at end of 10 years .....		11,840

The charge or 1,600dols. for renewals is equal 0.025 per cent. per annum on original cost of combination truss, and applying our formula, we have  $C \frac{(r' + r)}{r}$  equal  $x$ , equal 9,066 66dols. and

under this price we must build the iron bridge to obtain for it the merit of economy.

In the renewal of the combination bridge only the cost of timber has been figured, as the iron-work after ten years in it would certainly be as valuable as iron after the same service in the other truss.

#### GENERAL REMARKS.

If the end-braces or posts of a combination bridge are of iron (about 1dol. per lineal foot of truss will pay for Phoenix columns at end) and the top chord of timbers extending over not more than two panels, then the entire wood portion of truss may be renewed piece by piece, without the employment of any false work.

A properly-designed truss of wood and iron once carefully adjusted should require no more attention than one of iron. In fact, in the post combination no adjustment is possible, nor has it been found necessary. A change of length of probably 1-64 of an inch in the vertical rods, or 1-32 in the long diagonal, with double intersection, can hardly be expected to disarrange the relation of parts of a truss to any hurtful extent.

Of the many forms of truss which have been adapted to the combination principle, the lightest, most elegant, and suitable of all seems to have been entirely neglected. I allude to the inverted bowstring; for a deck bridge nothing can be more simple and effective, and it is as readily adapted to a through bridge as the "Fink" or "Bollman." By varying the length of panel the eye bars may be kept of uniform length, the diagonal bracing necessary is extremely light, the posts have but a panel load to carry except towards the centre of span between the points at which the stresses change sign under a moving load where there is a slight excess to be borne. The top chord being subject to the maximum stress from end to end, would occasion serious loss of economy if of metal, but being timber, the fact is immaterial (as all attempts to reduce the amount of timber towards the end of chords of that material to theoretic requirements have resulted in an expense of framing greater than the saving in timber), and furthermore, if there is any position about a bridge in which a cast-iron strut may be used with safety and economy, it is as a post in this style of truss. All these points considered, I think the inverted bowstring deserves a trial, at least.

Of the permanency of our iron bridges nothing has been said in this paper, as that question has been frequently raised and discussed. Future experience alone will decide it. That some of them will fail in parts exposed to moisture, but inaccessible to the paintbrush, is more than probable.

#### THE CONSTRUCTION OF WAREHOUSES AND WORKSHOPS.\*

(Continued from p. 485.)

THE subject of the supports to the floorings of warehouses and workshops best adapted to render the buildings capable of resisting for as long a period as possible the action of any conflagration that may occur within them now claims our attention.

For convenience, and economy of labour in stowing and delivering goods of all kinds, the floors of warehouses are usually made as extensive as possible. Many old warehouses are to be found in which the floorings and their supports, as well as the stairs, are entirely of timber. The story-posts and beams in these old warehouses having any considerable height or number of floors are generally found to be placed not more

\* By W. C. HOMERSHAM, C.E., in *Iron*.



than 10 feet apart centres, and the story-posts not to have a greater height than 7 feet 6 inches or 8 feet. The lowness of the pitch of the rooms made it unnecessary that the strength of the various supports to the flooring should exceed that which would suffice to carry with safety a uniformly distributed load of 2 cwt. per superficial foot of flooring, including the weight of the materials in the flooring.

When the columns are placed 10 feet apart centres, each column has to carry as many times 100 feet superficial of flooring as there are floors above it. In cases where there are five floors above the ground floor the story-post based on the ground floor has to carry 500ft. superficial of flooring, and as each foot of flooring is liable to be loaded to the extent of 2cwt., it follows that the story-post must be of sufficient strength to take with safety a load of  $\left(\frac{100\text{ft.} \times 2\text{cwt.} \times 5}{20\text{cwt.}}\right)$  fifty tons.

A story-post of red deal, 12 inches square by 7ft. 6in. in height, will carry with safety fifty tons, taking the factor of safety at 8; i.e., the crushing load of a story-post of red deal of the above scantling and height is, according to the formula given to the public by the late Mr. Eaton Hodgkinson, barely 400 tons and  $\frac{400}{8} = 50$ . By substituting cast-iron for timber in the construction of story-posts or columns, the engineer has been enabled not only to increase the height of all the floors, and particularly that of the ground floor, but to place the columns at a greater distance apart than 10ft. But few, if any, warehouses of any extent and of modern date have the columns placed closer than 12ft. centres, or have the ground-floor of a less height than requires the columns to be 12ft. 6in. in height.

The height or pitch of the compartments being increased, the floors of first-class warehouses are now usually constructed to take an equally distributed working load of 3 cwt., or, including the weight of the materials therein, a gross load of 3.2cwt. per foot superficial. The load that each column, 12ft. 6in. in height, placed 12ft. apart, and supporting five floors of a first-class modern warehouse, is liable to have to sustain is  $\left(\frac{12\text{ft.} \times 12\text{ft.} \times 3.2\text{cwt.} \times 5}{20\text{cwt.}}\right)$  115tons 4cwt.

whereas in the old style of warehouses the maximum amount of gross load of each bottom story-post of timber of a five-storied warehouse is but fifty tons, and furthermore the height of the story-post but seldom exceeds 7ft. 6in. or 8ft.

We remind the reader of this, as the amount of weight to be borne is not the only item to be taken into account when calculating the dimensions necessary for story-posts or columns. When the height is equal to thirty or more diameters of a column, the strength decreases inversely as the 1.7 powers of the height; hence we find that a solid cast-iron column 4in. in diameter by 15ft. in height would be crushed by a weight of sixty-five tons; whereas, with a height of 10ft., a solid cast-iron column of that diameter will not be crushed with less than nearly double that amount of weight, or 129 tons.

When the difference between the height and the diameter of a column or story-post is not so great as thirty times the diameter, the decrease of strength by the increase of height is not so rapid; thus calculation, by the well-known formula before mentioned, shows that while a story-post of red deal 12in. square by 7ft. 6in. in height, will bear with safety fifty tons, the safe working load is only reduced to 39.25 tons by increasing the height to 12ft. 6in. To carry a load of 115 tons a story-post of red deal 12ft. 6in. in height must have a scantling of upwards of 18in. square. By substituting best Dantzic oak for red deal, the scantling may be reduced to 16in.

A hollow column of cast iron, 7ft. 6in. in height, by 6in. in external diameter, having a thickness of .75in., will carry with safety, when securely fixed, 50 tons. The weight of such a column is 39.4lb. per lineal foot. For a column, 7ft. 6in. in height, to carry 115 tons, a good proportion is kept by making the external diameter 8in., and the thickness of the metal 1in. full; weight 72lb. per lineal foot. If the height of the column of cast iron be increased to 12ft. 6in., and the working load be 115 tons, then the diameter and thickness may be respectively 10in. and 1.5-1.6in.; weight 80lb. per lineal foot.

The above figures not only show the great economy of space gained by the use of cast iron in place of timber in the construction of story-posts,

but may be of use in following us in the consideration of some of the contents of two of the more remarkable, if not the most remarkable, literary productions it has ever been our lot to peruse. They are both by the same author.

The letter of Captain Shaw, the chief officer of the Metropolitan Fire Brigade, to the Editor of *The Times*, before referred to in these articles, and headed "Wood v. Iron," concludes as follows:—"There may be other materials suitable for the purpose, which are capable of resisting the effects of heat; and, if so, I hope we may one day hear of them. But, in the meanwhile, I venture to submit what I consider to be strong practical testimony in favour of massive timber for the internal supports of heavily loaded buildings."

Of what does this practical testimony consist? We would call the most careful attention of the reader to the details of the experiment from which the reasons were deduced by Captain Shaw that caused that gentleman to arrive at the conclusion that wood is better adapted than iron for the construction of the internal supports of heavily-loaded buildings.

After giving the particulars of the experiment, the letter of Captain Shaw continues:—"The lesson to be drawn from this I take to be as follows:—A massive story-post of even the most inflammable wood is absolutely and perfectly proof against any heat which can be applied to it, will not of itself burn at all, but requires a continual supply of highly inflammable substances to keep it burning, and when the supply is withdrawn ceases to burn; and, lastly, after being exposed for seven hours to flames of very great intensity, is not injured to a greater depth than about 2in. from the original outer surface, and still shows a centre as clean and as fresh as when first put in."

The words are those of the author of the letter. There is no misprint—the letter states, as above, that the most inflammable of woods (pitch-pine) "will not of itself burn at all." All our readers are aware that far less inflammable timber than pitch-pine will of itself burn, and that, too, pretty freely, even before the trees have been cut down and the timber seasoned; but still, the chief of the London Fire-brigade not only entertains but openly expresses a contrary opinion.

The reason for this (to say the least of it) extraordinary opinion being arrived at was the result of an experiment made, as we understand, at Captain Shaw's own suggestion, and under his own immediate direction. The particulars of that experiment, and the result, had better be given as in the letter to *The Times*:—

"A few months since a fire occurred in one of the enormous warehouses for which the docks of this metropolis are remarkable, and raged with great fury from a little before six o'clock in the morning until about eleven in the afternoon, when it was extinguished, and a large proportion of the building and its contents saved.

"The warehouse was constructed of brick walls; it had wooden floors supported on wooden beams, which in their turn were carried by wooden story-posts about 12in. thick, and although serious damage was done, not one portion of the heavy woodwork was destroyed.

"After the fire I was allowed to remove one of the story-posts with a section of the beams and other parts surrounding it above and below. This post had been subjected to the full action of the fire during the whole of its duration, as already mentioned, or, making full allowance for everything, including the delay in the fire attacking the particular spot on which it stood and the time at which the cooling process commenced, certainly not less than four and a-half hours. As we had used large quantities of water, and it was probable that the wood might have been somewhat saturated, I had it carefully dried for several days before a strong fire, until not a trace of moisture remained in it.

"I then set it on end in an open yard exactly as it had stood in the warehouse—with the pedestal underneath, the cap above, and the beam across the cap—placed more than a ton of shavings, light wood, and heavy wood round it, and, after saturating the whole heap with petroleum, applied a light to it. After this I kept men pumping petroleum and turpentine on it until my stock was exhausted. At the end of two and a half hours I withdrew the post, beam, and other parts from the fire, and within a few minutes from the time at which they were withdrawn they ceased to burn.

"I then sawed off horizontally a few feet of

that part which had suffered most from the flames, and afterwards split the same longitudinally with steel wedges in order to examine its condition.

"The post was of pitch-pine, about the most inflammable wood I know of, and yet, after exposure for seven hours to fires, the fury of which could not be exceeded except in a blast-furnace, it contained, and still contains, within it a quantity of perfectly uninjured and apparently fresh wood, probably capable at this moment of supporting the whole weight which the original post can have been designed to carry. Immediately after the saw-cut, and again after the cleaving with the steel wedges, I carefully examined the centre, and found it just perceptibly warm to the touch, but nothing more, thus proving that the fibre, in which the strength lies, must have been quite uninjured."

After reading these particulars of the experiment, is there one of our readers who will feel that the result justifies him in arriving at the startling conclusion that a story-post of pitch-pine, having a scantling of about 12in., "is absolutely and perfectly proof against any heat which can be applied to it, and will not of itself burn at all?"

We may at once state that, while demurring *in toto* to the conclusions arrived at by Captain Shaw, we see not the slightest reason to doubt the accuracy of the description of the particulars, or of the result as given.

The story-post, &c., we are informed, was exposed in the original conflagration "to the action of the fire for certainly not less than four hours and a half," but, unfortunately, there is no information as to the nature of the fire at the spot where the post was fixed; we are not even informed of what kind the goods were that were stowed around or near the story-post. It appears pretty certain that, either from the goodness of the design of the building, or from the nature of the goods, or the manner of stowing the same, the original conflagration was of a smouldering or carbonising kind, that is, from some cause, there was not a sufficient draught to supply to the site of the story-post the oxygen needful for the free burning of even a 12-inch baulk of pitch-pine. The readers of our former articles on this subject will be aware that we can easily conceive such a combination of circumstances at a large fire, as would cause baulks of timber to be destroyed by the action of charring or carbonisation in place of being calcined or burnt up.

The attentive reader would probably remind us that Captain Shaw says "not one portion of the heavy woodwork was destroyed," to which our reply would be: Doubtless that is the sincere belief of that gentleman; but is he acquainted with the fact that the strength of a story-post only 7ft. 6in. in height by 12in. square is reduced in strength in the proportion of from 37 to 13 by decreasing the scantling to 8in., or taking a layer of 2in. off each side? With a like reduction in scantling, a 12-inch story-post 12ft. 6in. in height is reduced in strength in the proportion of 37 to 11.7. Again, if the transverse strength of a 12-inch beam of timber be taken at 17, that of an 8-inch beam is but 5. If such reduction in strength of the main supports of a building is not to be termed destructive, what is?

If the conflagration was of a fierce, or consuming, in place of a smouldering, or carbonising kind, then we must account for the escape of all the heavy timber-work from being burnt to a greater extent than 2in. in depth in the space of four hours and a half to the skill of the firemen in directing the streams of the large quantity of water which was used.

However, be that as it was, we are assured by the experimenter that not one portion of the heavy woodwork was destroyed—only charred or carbonised to the depth of 2in. or thereabouts. But 2in. is the total thickness or depth of the timber on each side of the baulk reported as carbonised after our story-post had been subjected to a second fiery ordeal, the "fury of which could not be exceeded except in a blast-furnace." How much of this thickness or depth of 2in. was due to the action of the second conflagration in which the post was immersed for a period of two and a half hours, we are not informed.

Was the omission of this useful piece of information a mere oversight? Or, did it occur through the thickness charred being nearly if not quite the same before as after the second fiery ordeal, that it was deemed unnecessary to state the depth to which the original conflagration of four and a half hours' duration had affected the



timber? That the thickness was about the same at one period as at the other no person having the slightest acquaintance with the laws of combustion, and who has studied the particulars given in the letter to the *Times*, can for one moment doubt.

The staff of our fire-brigade have never studied the art of reduction, or destruction, by means of fire. Their concern is how best to prevent destruction thereby, and how most quickly to subjugate a conflagration when it bursts forth. Thoroughly must they have studied those all-important questions, and admirably do they bring their knowledge and experience to bear when called upon so to do. The public has but little, if any, interest in the question whether the officers of the London Fire-brigade are or are not *au fait* at the science of reduction, or destruction, by means of fire; and we should not consider it necessary to refer in these articles to the views expressed by the chief officer in his letter to *The Times* had not our attention been recently called to a small volume by the same gentleman, in which the most erroneous statements are made concerning the properties of iron.

No person would believe that a gentleman of the position held by Captain Shaw would publish statements which he knew to be incorrect; at the same time, from the very prominence of that position arises the danger. All, except some of the most practical men of the world, credit gentlemen so placed with the power of seeing the necessity of thoroughly informing themselves on any scientific subject before attempting to enlighten the public thereon; hence the necessity for our here explaining the erroneous nature of the deductions drawn from the result of this experiment on the combustion of timber, and the incorrectness of the statements made concerning the properties of both cast and wrought iron in a small volume published in 1872, by Effingham Wilson, entitled "Shaw's Surveys; or a Summary of the Principles to be observed in estimating the risk of Buildings. By Eyre M. Shaw, chief officer M.F.B."

(To be continued.)

#### AMERICAN OAKS.

AS in England, there are so many varieties of oak in America, that any detailed description of them all would be impossible; therefore, it will be as well only to notice those which have a commercial value, as such alone will be of any interest to the building trade. The white oak is found throughout the United States and Canada. In the former country it is most plentiful in the Middle States and in Virginia, particularly in that part of Pennsylvania and Virginia which lies between the Alleghanies and the Ohio, a distance of about one hundred and fifty miles. In the western districts it composes entire forests, and the yellow soil, consisting partly of clay, with a mixture of calcareous stones, yields abundant crops of wheat. The severity of the climate, the fertility of the soil, its dryness or humidity, are the causes which render the white oak so rare over three-quarters of the United States that it is inadequate to supply the local demand. This species bears the greatest resemblance to European oak, especially to the variety called European white oak. The American tree is 70 or 80ft. high, and 6 or 7ft. in diameter, but its proportions vary with soil and climate. It is the only oak on which a few leaves remain until the sap rises in the spring, and it may be known by this peculiarity and by the whiteness of the bark. The wood is reddish, and very similar to that of the European oak, though lighter and less compact. It is the best and most durable of all American oaks, but its price, although now lower than formerly, is still such as to prevent it being extensively used for building purposes in England, although for cabinet-making and such uses it has a demand. Of all the species that grow east of the Mississippi, the white oak alone furnishes staves fitted for containing wine and spirituous liquors. The home consumption for this purpose alone is something enormous, and vast quantities are exported to the West Indies and the islands of Madeira and Teneriffe. For ship-building purposes it is also very valuable. The European oak is tougher and more durable, on account of the superior closeness of its grain; but the American species is more elastic, requiring a shorter time and only half the weight to bend it. This advantage, however, does not compensate

for the openness of its pores, however valuable a quality it may be in ship-building. Michaux predicts that in consequence of the neglect of all means of preserving and multiplying this wood in the United States, a scarcity is to be looked for at no distant date, and urges the Americans to introduce the European species into their forests. According to Emerson, the roots of the white oak make very beautiful furniture, and Nuttall mentions a cabinet and table made from the forked branches of this tree, which may well vie with the finest woods known, being of a clear pale yellow, inclining to olive, and feathered in the most beautiful manner, the polish being equal to that of the finest mahogany. The over-cup white oak, called also burr oak, although a handsome tree, is not much esteemed for commercial purposes, as its wood is inferior to that of the white oak.

The post oak, called also box white oak and sometimes iron oak, although found in other states, is nowhere more abundant than in Maryland and in Virginia, between the Alleghanies and the sea. Wherever, says Michaux, the soil is dry, gravelly, and substantial, it forms a considerable portion of the forests, which are composed principally of the black, scarlet, Spanish, and black-jack oaks, the dogwood and the yellow pine. The upper part of the two Carolinas and Georgia, particularly where the pine and oak forests unite, is analogous in soil to that portion of Virginia referred to, and abounds in the post oak. The height of this species rarely exceeds 40 or 50ft., with a diameter of 15in. The branches are bent into elbows, which give it so peculiar an appearance that it is readily distinguished from other trees. The bark upon the trunk is thin, and of a greyish white. The wood is yellowish, with no tinge of red. Growing upon a less humid soil, it is less elastic, but finer grained, stronger, and more durable than the white oak; hence it is preferred for posts, and used with advantage by wheelwrights and coopers. In ship-building it is principally used for knees. The preference given in the West Indies to the staves from Baltimore and Norfolk is due, in a great measure, to their being made of the post oak. The over-cup oak, or swamp post oak, of the lower parts of the Carolinas and Georgia, is found exclusively in the great swamps on the borders of the rivers, which are often overflowed on the rising of the waters, and are inaccessible during three-quarters of the year. In these gloomy forests it is associated with the large tupelo, white elm, wahoo, planer tree, Carolinian poplar, water bitternut, hickory, and water locust. On the banks of the Savannah it has been seen upwards of 80ft. in height, and from 8 to 12ft. in circumference. The bark on the trunk is white, and the wood, though inferior to that of the white oak and the post oak, is more compact than would be supposed from the soil in which it grows. This species is the largest and the most highly esteemed among the oaks that grow in wet grounds. The swamp white oak, which grows in a number of the States, is a beautiful tree more than 70ft. in height. The trunk bears a scaly greyish-white bark. The wood is strong, elastic, and heavier than that of the white oak. In sticks more than a foot in diameter, the grain is fine and close, and the pores nearly obliterated. It is esteemed in quality next to the white oak, though from its rareness it is rarely employed in the arts. Chestnut white oak is most abundant in the maritime parts of the Carolinas, Georgia, and East Florida. Its wood, which is affected by the richness of the soil, is inferior to that of the post oak, the white oak, and even the over-cup oak, and its pores, though nearly obliterated, are more open. But it is superior to many other species, and is employed for wheelwrights' work and other objects which require strength and durability.

The rock chestnut oak is among the species which are not scattered promiscuously in the forests, but which grow only in particular situations, and easily escape observation; hence it is difficult to assign its limits with precision. It grows sometimes 3ft. in diameter and more than 60ft. high, but it rarely attains these dimensions. The wood is reddish, like that of the white oak, but its pores are more open, though its specific gravity is greater. It holds the next place to white oak in the construction of vessels. It is employed for the lower part of the frame, and oftener for the knees and the ribs. The live oak is commonly 40 or 45ft. in height, and from 1 to 2ft. in diameter. As it is very strong and incomparably more durable than the best white

oak, it is highly esteemed in ship-building. From its great durability, when perfectly seasoned it is almost exclusively employed for the upper part of the frame. To compensate its excessive weight, it is joined with the red cedar, which is extremely light and equally lasting. It does not afford large timber, but its wide and branching summit makes amends for this disadvantage by furnishing a great number of knees.

The black oak rises to a height of 80 or 90ft., and is from 4 to 5ft. in diameter. The wood is reddish and coarse-grained, with empty pores. It is, however, more esteemed for strength and durability than any other species of biennial fructification, and, for want of white oak, is often employed for building purposes.

The red oak is frequently more than 80ft. in height, and 3 or 4ft. in diameter. The wood is reddish and coarse-grained, its principal use being for staves. There are several other varieties in America, but they do not offer sufficient interest for any notice, some being only used for fuel, and the others either unfit for manufacture or so scarce as to be practically useless.

#### THE ASSESSMENT OF TRAMWAYS.

AT the Middlesex Sessions, on the 9th inst., the case was decided of the North Metropolitan Tramway Company (appellants) *v.* the Assessment Committee of the Stepney Union (respondents) as to the assessment of the appellant's tramways in the parish of Limehouse, and the hamlet of Ratcliff.

The assessments appealed against were in respect of the tramways of the company, and were made by the overseers of the respective parish and hamlet in April, 1873, in the amounts of £351 for Limehouse and £182 for Ratcliff. The company appealed to the Assessment Committee against these amounts, but the committee confirmed them, hence the further appeal to the General Assessment Sessions, by which the company, acting on the advice of their surveyor, Mr. Ryde, sought to reduce the rateable values to £110 and £48 respectively. One of the original objections of the company was that the land used as a tramway was not properly and legally liable to assessment, but this, of course, had to be abandoned after the decision in the Court of Queen's Bench, in favour of the parish, in Pimlico, Peckham, and Greenwich Tramway Company *v.* parish of Lambeth, given in November last. At the opening of the sessions in May last there were several tramway appeals set down for hearing, some of which had been adjourned from the sessions of the year previous, so that the Court might have the benefit of the judgment of the Queen's Bench case quoted above. It was arranged that the case of the London Tramways *v.* the Parish of Lambeth should be taken first. The court was occupied six days with the voluminous evidence and lengthy arguments in this case, and an elaborate written judgment was given, laying down the principles upon which the court based their decision, and setting out that the rating of the tramways should, so far as the circumstances would allow, be calculated in the same manner as in the analogous cases of railways, viz., that the annual value to a hypothetical tenant should be deduced from the earning power of the rateable hereditament, commencing with the gross receipts, deducting the working expenses incurred in earning those receipts, as also an allowance for interest of tenants' capital, tenants' profits, and repairs and renewal of stock; and further deducting a sum to represent the annual average cost of repairing and renewing the tramway; the balance remaining would represent the true rateable value. The court then adjourned until the 7th inst., expressing the hope that after the publication of the principles laid down in the Lambeth case the parties would consult and endeavour to harmonise their widely different figures. The result was that the parishes in some cases, finding their estimates too high, abandoned their cases; in others the Tramway Companies, finding that applying the principles laid down by the court they could not successfully attack the assessments, abandoned their appeals. Amongst the latter were the cases of the Stepney Union, the original estimates for which were made by Messrs. A. and C. Harston, the rating surveyors on behalf of the parishes, in the same manner as has since been ratified by the court. The court decided that as the appeals were abandoned, the costs must follow the event.



## BOOKS RECEIVED.

*Course in Descriptive Geometry for the Use of Colleges and Scientific Schools*, by Prof. WATSON (Longmans, Green, and Co.), is a very good textbook of the science of descriptive geometry. An appendix is added containing stereoscopic views of the solutions in space of the principal problems.—*Mechanics' Geometry*, by ROBERT RIDDELL (London: G. Rivers.), is by the well-known author of a treatise on staircase construction which we, some years since, reproduced. The work is designed to teach the carpenter and joiner, the mason, or metal-worker, or any other artisan, the knowledge of the constructive principles of his calling. To secure this end, the illustrations given are not mere surface diagrams, but actual models in cardboard of the figures represented, by means of which the student can be shown the lines brought together in actual projection, and thus be made more readily to understand the geometric plan the parts will cover when laid back upon the level surface of the illustration.—*The Accepted Ceremonies of Craft Freemasonry*, by A. E. MASON. P.M. 30° (London: Elliot Stock), contains a full description of the accepted ceremonies of Craft Freemasonry. It is intended for circulation among Masons only, and will be unintelligible to the uninitiated public. To Freemasons desirous of a practical knowledge of the ritual of their order, especially members of provincial lodges, where the ceremonies are sometimes, either from ignorance or carelessness, maimed and abridged, the work will be found very useful.—*The Practical Guide to Perspective*, by JAMES P. KNIGHT, Head Master of the Cheltenham School of Art (The Educational Trading Company, Limited), has reached its seventh edition. Altogether nearly twenty thousand copies of this little book have been issued. It is a very cheap and comprehensive manual of linear perspective, and should be in the hands of all willing to avail themselves at so reasonable a rate of the long experience, as a teacher of drawing in some of our best schools, of its author.—*Churches and Church Warming* (J. Jones and Sons, 6, Bankside) is a treatise explanatory of the method of heating churches by hot water on the system introduced by its authors, whose long experience in this matter are well known to most of our readers. Ground-plans are given of a number of churches in which the system has been adopted, and architects and clergymen can thus readily form for themselves an idea of the way in which it may most advantageously be introduced into buildings in which they are interested.—*The Million on the Rail*, by G. W. JONES (London: Davies & Co.), is another attempt by its author to urge the adoption of his scheme of universal penny railway fares, as advocated by him more than four years since before the Society of Arts. Mr. Allport, of the Midland Railway Company, who joined in the discussion on that occasion, very plainly told Mr. Jones that the introduction of anything like his plan would mean utter ruin to any company that tried it, and of the correctness of this opinion there can be little doubt.—*Cox & Sons' Illustrated Catalogue of Decorations for Christmas* (London: Cox & Sons) will be very welcome just now to all church-decorators. No other firm has devoted so much attention to this branch of church-decoration, and the hints contained will be found especially acceptable where the services of amateur decorators are likely to be freely offered, uncontrolled by any real art knowledge. The articles catalogued are very cheap—in most cases much cheaper than they could be made at home.—*Beeton's Penny Book of Cab Fares* (London: Ward, Lock, and Tyler) contains over 35,000 fares, and may save many an appeal, these dark wet nights, from the extortion of the London Jehu to the friendly but perplexed policeman, if only the former can be persuaded to accept its authority.—*Technological Dictionary in the English, German, and French Languages*. Edited by A. TOLHAUSEN (London: Sampson Low, Marston, Low, and Searle) is the second part of a very useful work. The first part (French, German, and English) was issued last year, and the third (German, French, and English) is promised early next year. The usefulness of the second part is much enhanced by its being neatly bound in one volume instead of being issued, like the first part, in two volumes with paper covers. The work contains about 76,000 English terms with their German and French equivalents, for technical expressions em-

ployed in the arts and trades. It is a pity that the supplement added of "such terms as have turned up whilst the work was going through the press" could not have been incorporated in the main body of the book; the technical terms therein are comparatively few, and scarcely any of them are new.—*The Boy Joiner and Model Maker*, by E. A. DAVIDSON (London: Cassell, Petter, and Galpin), will rejoice the heart of many a juvenile carpenter. It contains practical directions for making numerous articles for use and ornament, with descriptions of various tools and methods of using them. The name of its author is a guarantee that it is something more than a mere "boys' book;" familiarity with its pages is likely to lead many boys to the profitable study of Mr. Davidson's more advanced manuals.—*Pocket Calculations for Timber Merchants, Builders, Contractors, Carpenters, Joiners, Packing Case Makers, Pianoforte Manufacturers and Others*, by W. RICHARDSON (London: Kelly and Co.), is a necessity in any of the trades enumerated above, owing to the different standards by which deals, &c., are sold. The increased number of dimensions now imported, and the late advance in prices of all kinds of timber, are additional reasons for its possession by all connected with the trade. The information is compressed into the briefest and most portable form, and will be found extremely useful in the yard or sale-room.

## Building Intelligence.

## CHURCHES AND CHAPELS.

**BELFAST.**—A new Reformed Presbyterian Church is in course of erection at Belfast, from designs by Mr. W. W. Batt, jun. Mr. Matthew Mansell is the contractor. The church will be 40ft. wide and 60ft. long, entered through a vestibule 8ft. wide. There will be a gallery at one end. Underneath the church will be a large schoolroom, 39ft. 6in. by 54ft. and 12ft. high. The lower story will be built with Scrabo stone, having dressings of red brick; the remainder will be red brick with dressings of Dungannon stone. The style adopted is Romanesque, having on front and sides pilasters, raised on main face with corbellings over.

**BRISTOL.**—A new altar and reredos have been erected in the Roman Catholic Church of St. Nicholas, Bristol. The altar is open, upon five arches resting on marble shafts. The reredos is divided into five compartments, the centre one having in the lower part the tabernacle, above being an expository open on three sides, surrounded with marble shafts which carry a gabled canopy. The side compartments of the reredos are panelled, and finished with crocketed gables, enclosing sculptured emblems of the Four Evangelists. The reredos and altar, which have cost about 100 guineas, were designed by Mr. Charles Hansom, who was architect of the church. Caen stone has been used, the work having been entrusted to Mr. Boulton, of Cheltenham.

**DOLTON.**—The parish-church of Dolton, North Devon, has been reopened, after restoration at a cost of £1,600. The whole of the external walls are new; the roof is now thoroughly good; the galleries have been removed; the tower, which was in a disgraceful state internally, has been opened to the church; the sittings are new and uniform throughout; and stained-glass windows have been placed in the chancel and south aisle. The most remarkable feature of the old church was the font, which was carefully cased up under one of the pews. This font, on being brought to light, proved to be a Saxon relic, covered on its surface with rope tracery. The work has been executed by Mr. Folland and Mr. R. Bailey, of Dolton, and carried out under the superintendence of Mr. G. Arnold, Diocesan Surveyor for the Archdeaconry.

**KENNINGTON.**—The new church of St. John the Divine, Kennington, was consecrated on Saturday. Mr. G. E. Street is the architect. The church has cost £20,000, and the tower yet remains to be added. There is a very fine reredos, consisting of a triptych, in the centre of which is a representation of the Crucifixion on a gold ground. Among the figures in one of the side panels is the late Bishop Wilberforce. The reredos is supported on a solid brick structure at the back of the altar, and rests on the highest of

three ledges, on which also is a jewelled cross nearly 2ft. in height. On the north side of the chancel the organ is raised on a stone platform, in front of which, between the two arches which separate this chamber from the nave, is a stone figure, some 5ft. high, of St. John the Divine, holding the chalice in his left hand. The figure is surmounted by a stone canopy.

**KETTERING.**—A new temporary church has been erected at Kettering, from plans by Mr. R. W. Johnson, architect, of Melton Mowbray and Kettering, the builder being Mr. Charles Sharman, of Kettering. The estimated cost is £875. It is a plain, substantial structure of red and blue brick, with Bath-stone facings, with an entrance porch 7ft. 6in. by 9ft. 3in. The interior is 65ft. by 30ft., and is estimated to seat 300 people.

**LISBURN.**—On Wednesday week the foundation-stone of a new Methodist Church was laid at Lisburn. The church is intended to seat 430 persons, and will be 60ft. long, 36ft. wide, and 30ft. high in the inside. The style is a modification of Continental Gothic. The building will be faced with Belfast brick, and will have dressings of Dungannon sandstone, relieved by a few columns, carved caps, and enriched cornice on the front. A large circular stone-window will be provided in the front gable, and a similar light in each of the gables of the side wings. The church and school, &c., will be built in accordance with the design of Mr. Wm. Gray, M.R.I.A., architect, Belfast, and the builders are Messrs. Thompson, of Ballymacarrett.

**SOCIETY FOR PROMOTING THE ENLARGEMENT, BUILDING, AND REPAIRING OF CHURCHES AND CHAPELS.**—The usual monthly meetings of this Society were resumed on Monday at the Society's House, 7, Whitehall. Grants of money were made in aid of the following objects, viz.:—Building new churches at Ealing, St. John's, Middlesex; Kilburn, St. Luke, Middlesex; Matfield, in the parish of Brencley, Kent; and Ayot, St. Peter, Herts; enlarging or otherwise increasing the accommodation in the churches at Bethnal-green, St. Peter's; Great Grimsby, St. James's; Isfield, Sussex; Leintoth Starks, Hereford; Little Chart, Kent; Little Dean, Gloucester; Much Marcle, Hereford; Poling, Sussex; Ormesbury, St. Cuthbert, York; Sutton Valence, Staplehurst, Kent; and Curn, Flint. Under urgent circumstances, the grant formerly made towards building the church at Brookfield, in the parish of St. Ann, Highgate, was increased. Grants were also made from the School-church and Mission-house Fund towards building school or mission churches at Accrington, Lancashire; Horton St. Andrew's, in the parish of Bradford, York; Long Wick, in the parish of Princes' Risborough, Bucks; and Low Fenton, Stoke-on-Trent. The Society likewise accepted the trusts of sums of money as repair funds for the churches at Honor Oak Park, St. Augustine's, Kent; and Blundellsands, St. Nicholas, near Septon, Lancashire.

**WALTHAMSTOW.**—The consecration of the newly-erected church of St. Saviour, Walthamstow, was performed last week. The church, with vicarage, has been built from the design of Mr. F. T. Dollman, of Adam-street, Adelphi. It consists of nave, aisles, baptistery, apsidal chancel, with vestries and organ-chamber. The nave has five bays in its length, with clerestory windows over, so arranged as to form a continuous arcade. The tower is surmounted by a spire at the north-west angle of the church, the total height being 170ft. The tower contains a peal of eight bells from the foundry of Messrs. Warner. The church is faced externally with Kentish rag; the quoins and dressings of windows, doors, &c., are of Tisbury stone. It is seated for 850 persons.

## SCHOOLS.

**LEEDS.**—On Wednesday week four new Board schools were opened, and the memorial-stones of four others laid, at Leeds. The memorial-stone was first laid of the new Woodhouse School. Allowing 10 superficial feet to each child, accommodation is provided for 694 children; and the total cost will be £5,507. 13s. 6d. The works are being carried out from the designs of Mr. Richard L. Adams, architect to the Board. The Barley-road Schools were opened. The schools are divided into three departments, providing for a total of 705. There is a main schoolroom about 48ft. by 30ft., three classrooms, separate entrances, vestibule, and lavatory. The builders' contracts amount to £5,880. The architects have been Messrs. Alexander and Henman, of Stockton-on-



Tees. Burley Laun School, of which the memorial-stone was laid, is intended to accommodate 728 children, allowing 10 square feet of school area for each child. The builders' contracts amount to £5,968. The Green-lane Schools now open furnish accommodation for 1,030 children. The builders' contracts for the works amount to £10,228. The new school at Upper Wortley will be built of brick throughout, faced externally with the best hand-pressed red bricks; internally, plastered. Accommodation will be provided for 694 children, and the total cost will be £6,683. The works are being carried out from the designs of Mr. Adams, architect to the Board. At the Jack-lane School, opened, the walls are constructed of brick, faced externally with hand-made pressed bricks to the fronts, and machine-made bricks to the back and outbuildings. The dressings are of sandstone finely bosted. The architects are Messrs. Adams and Kelly, St. Andrew's Chambers, Leeds. The total cost amounts to £5,967, and the schools, allowing 10 superficial feet for each child, will accommodate 677 children. The Hunslett Carr School will be of brick, faced throughout with red hand-pressed bricks. The dressings are of sandstone. Accommodation will be provided for 727 children, and the total cost will be £6,706. The architect is Mr. R. L. Adams. The new Saville-green School, opened, will provide accommodation for 471 children, and the total cost has been £4,911. 17s. Mr. Adams is the architect.

#### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

To OUR READERS.—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.  
Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

#### ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 9d. per line.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

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(Payable in advance).

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N.B.—American and Belgian subscribers are requested to remit their subscriptions by International P. O. O., and to advise the publisher of the date and amount of their remittance. If the last-mentioned precaution is omitted, some difficulty is very likely to arise in obtaining the amount. Back numbers can only be sent at the rate of 7d. each, the postage charged being 3d. per copy. All foreign subscriptions unaccompanied by an additional remittance to cover the extra cost of forwarding back numbers are commenced from the next number published after the receipt of the subscription.

Cases for binding the half-yearly volumes, 2s. each.

Subscribers receiving their copies direct from the office are requested to observe that the last number of the term for which their Subscription is paid, will be forwarded to them in a coloured wrapper, as an intimation that a fresh remittance is necessary, if it be desired to continue the subscription.

RECEIVED.—J. W.—H. A. G.—C. B. A.—E. W. G.—F. A.—Manchester.—J. S. and Co.—W. S. and Sons.—J. T. T.

J. F. DOYLE (Drawings to hand).—D. J. (You had better advertise. At all events, we shall not advertise your want for nothing).—MUNICEPS (Too insipid for the occasion. The name you mention would evoke as much opposition as that of Mr. Burgess. Be assured the Committee will be in no hurry to appoint a successor. Read C. B. A.'s article in another part of this impression of BUILDING NEWS). IPSO JUNG (Do not believe it, or if you doubt, try the experiment for yourself).—SUCTION (A small lift-pump, with single barrel, would be best for the purpose. In the articles on Plumbing in the BUILDING NEWS, "Suction" would find all information. We do not think an ordinary wooden pump would adequately suffice).—J. H. (In due time).—MIDLAND (See our answer to "A. H. D. C.")—J. F. DOYLE (The drawings to hand).

A. H. D. C.—The matter to us is a very simple one. A certain Manchester firm of architects think proper to put on the back of their cards the names of the principal works they have executed. A correspondent last week sent us the card, and expressed a wish that we should condemn the practice, as it tended to "lower the dignity

of the profession." We confess we did not so regard it, and said we saw no reason why an architect should not so act, as well as an author. You institute a comparison between architects, lawyers, and doctors, and say lawyers and doctors would not so violate the established etiquette of their respective professions. The comparison, however, is not a good one. Lawyers and doctors possess certain privileges guaranteed by law, which no other professions are ever likely to have. Besides, lawyers and doctors cannot put on the backs of their cards the principal works they perform, because, as a rule, their works are *private*; whereas, as a rule, the principal works performed by architects are public, and for the public. Though a medical man cannot, according to the traditions and practices of his profession, advertise himself directly, he can and does advertise himself indirectly. He writes a book on some particular division of medicine or surgery, and he can keep on advertising the book year after year, and though they may not sell many extra copies of the work, they keep the author's name before the public, and so advertise him. It is well known that many of the best men in the medical profession do this. You say "a trade is supposed to apply to the public for patronage, and a profession is to be applied to by the public for its advice and assistance." If you would look a little deeper you would find that both trades and professions in reality apply to the public for "patronage," as you term it, as it is to the public they render services, and from the public they alike draw their resources. We live in free times, and you cannot bind down architects to any recognised mode of action. It is useless to say because a thing has been done, or because a custom has hitherto been acted on, therefore it shall be henceforth. You must look at the intrinsic worth of the action; and for the life of us we cannot see why a man who has built a church or decorated a cathedral, may not say so, either by describing it in a paper before a public society, or in a book, or on the back of his card. There is nothing "lowering the dignity" of the man in doing so, and what does not lower the dignity of individuals cannot be derogatory to the dignity of multitudes.

E. WELBY PUGIN.—We are not acquainted with the merits of the matter in dispute, or we might, as you wish us, "fire a shot at the Institute," or perhaps at you; and we feel all the more disinclined to give an opinion even, as you intend to ask for legal penalties. That you and the Institute should get at loggerheads is natural enough, and when men cannot get on together in partnership, they are better separated, and if they can separate amicably, all the better. We were not surprised that you had ceased to become a member of the Institute, but we were surprised at the mode adopted of telling the world you were expelled. It appears as if the Institute had the power of a giant, and used it as a giant; or why should the president have commenced the proceedings of the session on Monday fortnight by parading the fact? We should have thought that another and less pretentious method of procedure might have been adopted. You might have been requested to resign, or, failing that, you might have had your membership abruptly terminated. But we see no reason why the fact of your expulsion should, to your manifest disadvantage, be prominently trumpeted to the world. Possibly you deserved it, but we do not all get our deserts, whether we are members of the Institute or not; and it is not magnanimous, to say the least of it, to see a body of men in full possession of power and authority, triumphing over, it may be, an erring or fallen brother. The report says that the announcement of your expulsion was received with "loud and prolonged applause." What a pre-eminently heroic gathering it must have been! What delightful heart-throbs must have bounded through the meeting? But we wish in no way to prejudice the case, or to express an opinion even on its merits. We only take exception to the method of expulsion. We would, however, caution you about going to law with a public body like the Institute of Architects, who, in all probability, acted within the limits of their legal power. The issue in a court of law will depend almost entirely on the technical interpretation of law. You have asked us for a word of encouragement. We venture in return to give a word or two of advice. Have as little to do with law and lawyers as possible, and remember the words of the Duke of Wellington, who said, "the next evil to a great defeat is a great victory." In law courts both plaintiffs and defendants are generally the losers, whilst the lawyers for both plaintiffs and defendants are generally the gainers. Next, we would say, go straight on in the performance of your professional duties, and all the Institutes in the world cannot injure a hair of your head, and in all probability would not if they could. You may in your isolation, if you think proper, console yourself with the thought that nine out of ten of the architects of England do not belong to the Institute, and therefore do not, under any circumstances, subject themselves in the remotest degree to the liability of being expelled; and in all probability they suffer no inconvenience from their policy of isolation.

### Correspondence.

#### ANOTHER COMPETITION.

(To the Editor of the BUILDING NEWS.)

SIR,—The appended letter, received in reply to an application for particulars and plan of site in connection with a recently-advertised competition at Kendal, needs no comment.

I am, Sir, &c.

UN-CROWNED.

November 17, 1874.

#### "WATTSFIELD ESTATE COMPETITION."

"Dear Sir,—I inclose you copy of the conditions for this. I do not furnish copies of the plan, but any competitor may take a copy at my office free of cost. However, if you like, I will send you rough trace of the survey on same scale as competition on receipt of 5s. in stamps.—Yours truly, &c."

#### TAUNTON COLLEGE SCHOOL.

SIR,—Just any of your readers may be under a misapprehension as to the authorship of the design for Taunton College School which appeared in your issue of last Friday, I wish to state that it was prepared by Mr. C. E. Giles, in connection with his then partner, Mr. Walter Robinson (now of Cambridge). The name Giles and Gane appeared on the lithograph by mistake. I am, Sir, &c.,

RICHARD GANE

(Giles & Gane, Architects).

7, Furnival's Inn, E.C., November 16th, 1874.

### Selected Correspondence.

#### THE COMPLETION OF ST PAUL'S.\*

SIR,—The first step towards the development of a scheme for the improvement of the interior of St. Paul's by means of furnishing would be to determine to what kind of effect the building would most readily lend itself. Everybody knows that the main defects of the interior of St. Paul's are due to the impossibility of the task which was imposed on Sir Christopher Wren—namely, to build a Classical cathedral on a Gothic plan. If any one with an eye to appreciate the broader effects of architecture enters the west door of the cathedral—as one should do—his impressions will probably be something to this effect. He will see straight before him a very long tunnel, broken only towards the farther end by a somewhat sombre shaft and dwindling away miserably at the extreme east, where he may barely discern an altar of low elevation covered with tawdry draperies. To right and left he will see a monotonous range of square piers with deep reveals, dividing the main tunnel from the aisles; and their interminable vista will have no effect but to enhance the sense of length, which is already predominant. As he walks farther east, the shaft of the tunnel widens, and the sense of its space grows upon him, so that the disproportion between that space and the openings which lead into it becomes continually more apparent. This deficiency is felt mainly in the entering arch of the choir, the width of which is at present decreased in effect to less than its actual size by the projection on each side of a half of the organ. The continuity of the tunnel, which was the main characteristic of the building which struck the visitor on entering, so far continues to prevail that the eye will still be drawn towards the apse, the end of the tunnel, and he will then see that the appearance which this end had of dwindling miserably away was the result of the actual architecture of the building, caused as usual by the attempt to unite Gothic features with Classical, the clerestory of the choir with the semidome of the apse. When he stands under the dome, and makes a deliberate effort to realise its vast dimensions, he will feel how small a value it had as an integral part of the ensemble which he saw from the west, and how exclusively the tunnel effect had predominated in his imagination.

If the building had been a Gothic cathedral, the effect would have been somewhat of the following kind. On entering the cathedral at the west, the visitor would have seen the vista continuous as far as the farther or eastern side of the shaft, which will in that case be represented by the lantern of the tower. There the eye would be abruptly stopped by the screen surmounted by the organ or by the rood; and the space and height of the lantern would be appreciated in its full or even in an enhanced value. The choir would impress the imagination with a sense of unexplored length, space, and mystery. The rows of columns on either side would either have been light clustered shafts, allowing an adequate sense of the space of the aisles, or they might have been piers not less massive than those of St. Paul's, as they are in the well-known example of St. Alban's Abbey. In the latter case the eastern reveal of each pier would have had its altar and altar-piece of sacred painting, and the long vista of decorated shrines would have produced a *coup d'œil* such as would amply have compensated for even an exaggerated length of proportion.

If the Cathedral had been completely Classic, the effect aimed at would have been such as is indicated in that noble first design of Wren's, of which the model is to be seen at South Kensington. In this the dome is everywhere and from all points predominant, owing to the ample proportion of the entering arches and the shortness of

\* From the Pall Mall Gazette.



the three arms of the cross, while the varied design of the nave would have avoided the appearance of undue length and monotony of effect. Now it is quite clear that such an effect as that aimed at in this latter case is unattainable in the present St. Paul's. Further, it is evident that in completing a building, whereas all details of furniture and decoration must closely follow the character of the architectural style—(that is, must in this case be Classical)—the general scheme of its arrangement must supplement the broader characteristics of the design, and must subserve effects which are involved in the plan of the building. Consequently, the effect aimed at in the completion of St. Paul's must be generally that which we saw to be typical of a Gothic cathedral.

Accordingly, the matter of first importance is to arrest the eye at the commencement of the choir, so that the extreme apparent length of the central tunnel may be shortened and the vast dimensions of the dome more distinctly felt and appreciated. The position of the organ in the cathedral as Wren left it insured this effect; and since, for the exigences of the dome service, it has been removed, many plans have been proposed, all of which might be made in some measure to answer the same purpose. The relative merits of these plans can only be decided upon a full knowledge of the ceremonial requirements of the cathedral. At first sight it would appear that a position for the main altar at least as westerly as the entering arch of the choir, would answer the necessities of the largest congregation, and that Wren's choir would be of the dimensions requisite for the minor services. If this were so, Wren's original arrangement might be completely restored, and a nave altar might be placed west of the screen. Leaving, however, this question to be decided on the ground of a full knowledge of the ceremonial necessities of the Cathedral, I should only insist that in any case the view into the choir from the west should one way or another be broken. Supposing the present position of the altar be retained, this effect might be sufficiently insured by a large cross suspended in the entering arch of the choir of sufficient size and substance to break the tunnel effect of the central vista, and to render the defective termination of the apse less conspicuous. Such a modification, which would involve only the introduction of a feature easily removable, would be in obvious effect a more real improvement to the ensemble than the most ambitious structural modification which has yet been proposed.

The next point would be the furniture of the reveals of the arches of the nave and choir. We saw that under similar conditions in a Mediaeval church each eastern reveal would have been furnished by an altar, altar-piece, and other instruments of worship. In the present instance, as the multiplication of altars has no authority in modern English ritual, something equivalent in effect would have to be sought. The introduction of noble, sacred pictures in these positions would aesthetically answer the same purpose, and would render the multiplication of piers a valuable element of varied effect rather than of dead and wearisome monotony. Moreover, as the introduction of such pictures would not be limited by ritual convention to one reveal of the piers rather than the other, both their eastern and western sides might be thus furnished, and the view either towards the east or towards the west would be equally effective.

In the time of Sir Joshua Reynolds, the completion of St. Paul's by the introduction of religious paintings was proposed and discussed, and it is to this day a question whether the painting of the panels of the architecture was intended, or the introduction of pictures in frames. It is the latter treatment which seems to me advisable in furnishing St. Paul's. It would be an adequate test of the superintending architect's sense of proportion that he should so regulate the size and position of the pictures that they should enhance, rather than detract from, the architectural effect. Meanwhile, another art, better able, as I think, than decorative architecture to endure the test, would be called upon to bear the chief responsibility; and whether it was determined to select old pictures or to give commission for new, there is little doubt that within a reasonable time the Cathedral might be furnished with works of art which need never disgrace it, and might soon be made obviously worthy of its great fame.

Further, should the time ultimately arrive when such a work as the completion of St. Paul's in permanent material might safely be undertaken—

should the conditions arrive for such an enterprise in unanimous enthusiasm and general confidence in a superintendent artist—then the present outlay in works of permanent value would prove to have been no less than a profitable investment, and posterity would acknowledge the prudence and foresight of our own time as displayed in what it had done no less than in what it had left undone.—I am, Sir, yours obediently,  
BASIL CHAMPNEYS.

## Intercommunication.

### QUESTIONS.

[3548.]—**Interference with Lights.**—We occupy a house, under a lease, 35ft. high, with a roadway 39ft. wide, wall to wall. For a period of fifty years we have been fronted by a row of houses 26ft. high. These have been pulled down, and are being replaced by a building which is proposed to go 70ft. high. This would materially injure our lights. Have we any power to prevent this great height being attained? We should feel very thankful for an early answer to this.—F. S.

[3549.]—**Circular Shaft upon Cylindrical Vault.**—"Inquirer" wants to know the "best mode of constructing a circular brick shaft of 15ft. diameter upon the crown of a cylindrical vault or tunnel underground 26ft. in span, the arch being a semi-circle." The usual method, as he says, "leaves the shaft partly supported on the broken courses of the arch. This part is very weak, and would easily give way should any great weight from the surrounding strata come upon it."

[We have inserted this question that it may lead to some practical suggestion being thrown out: One mode of avoiding the weakness of a round shaft cutting into and resting upon the crown of an arched vault would be to insert a square cast-iron frame, formed to the inner curvature of the arch, against the sides of which the courses would abut. It would, indeed, be a kind of iron trimming.—ED.]

[3550.]—**Sewer Ventilation.**—A gentleman has patented a system of sewer ventilation by connecting the sewers by a pipe with the ash-hole (closely closed) of boiler furnaces. I have some recollection of having seen this scheme advocated in one or other of the London weekly magazines; if so, could you or any of your numerous readers say where such is to be found, and whether a patent could be sustained under such circumstances? In places where there are no furnaces, would that patent cover a shaft, with gas jets inside, to create the necessary air current?—INQUIRER.

[3551.]—**Measuring Plaster-Work.**—Would you kindly inform me, through the columns of your esteemed paper, what is the trade practice in measuring plaster-work? Is the whole surface measured, and then the area of windows, doors, and grates deducted? Of course the recess, if any, to the windows is measured. I am told the space occupied by windows is measured as plaster.—B. W. J.

[3552.]—**Ecclesiastical Commissioners' Fund.**—Are there any records printed showing how the moneys from the Ecclesiastical Commissioners are divided amongst the English churches?—J. M.

[3553.]—**Dry-Rot.**—What will check this pest in its first stage?—F.

[3554.]—**Temporary Iron Churches.**—Can any correspondent oblige me with the following information? 1, Cost of such buildings per foot, and accommodation; 2, experience as to durability; 3, materials and mode of construction; 4, examples; 5, means taken to prevent radiation of heat or to equalise temperature, and any other detail.—BUILDER.

[3555.]—**Improved Dwellings.**—As possibly the information may be of some use to others besides myself (and allow me to say I think this should be the test of all occupants of this valuable part of your journal), I should be obliged to any informant who could supply me with statistical information respecting the various societies and buildings that have been established of the above kind. Such information should give number lodged in a given area, height of building, arrangement of ditto, cost of building, rents of flats or rooms, sanitary regulations, &c. I am aware of one or two works professedly treating on the subject; but they are old and very imperfect.—G.

### REPLIES.

[3477.]—**Zinc Roofs.**—I am perfectly well acquainted with Mr. Edmeston's mode of laying the Vieille Montagne zinc, and it is the principle I have adopted myself in several flats. It is also a similar mode to the one suggested in my reply. The sheets are not confined, but simply lap over and turn under one another, and are kept in position by strips of zinc or clips.—G. H. G.

[3520.]—**Brewery Tanks.**—Apply for the money, give reasonable (stated) time for payment, and in the event of non-compliance recover in the usual manner.—P.

[3521.]—**Prime Cost.**—The term prime cost means what the name implies—first cost. "Prime—First,

original" (Walker). "Prime—First in order of time; original, as prime cost" (Ogilvie). That is to say: What the article in question costs the purchaser in the first place; or the money which actually changes hands in its purchase free of any consideration of carriage, commission, fictitious statements of price, or the like. For instance, drain-pipes are sold at a fixed list price with 40 or 50 per cent. off, according to the state of the market at the time of purchase. Consequently, prime cost would be not the list price, but that amount less the 40 or 50 per cent., as the case may be. An architect who specifies articles at a stated prime cost is justified in demanding the production of either an invoice or receipt, or, if entertaining an honest doubt of the authenticity of either (as the preparation of fictitious documents of this description is not rare) in witnessing the actual expenditure of the money, or deducting the amount and expending it himself. It would be, perhaps, desirable, and prevent a deal of wilful misunderstanding, if architects stated that all prime cost allowances were to be considered as ready-money prices. The prime cost of the article in question would be arrived at thus:—

Fictitious cost .. ..	£50
£20 per cent. .. ..	10
	40
£2, 10s. per cent .. ..	1
	39
Carriage, &c. (say) .. ..	2
Net prime cost .. ..	£37

treating arrangements as to free-delivery, commission, &c., merely as dodges (common, but none the less disreputable) to defraud employers.—F.

[3523.]—**Extras and Deductions.**—"J. H. J." may be right in saying the nature of the agreement is at fault, and this is precisely what I meant by alluding to the wording of the contract. If "quantities" were supplied, they certainly were very imperfectly taken to give room for such quibbling; but the builder is quite as much in fault in accepting what he probably knew to be imperfectly described items. The fact is, both parties are in fault, one for drawing up imperfect documents, and the other for accepting them.—G. H. G.

[3530.]—**Hydraulics.**—"L." is so good as to tell your readers my reply is "evidently defective and misleading, contrary to all scientific teaching." I am obliged to him for his candour, but he does not explain his reasons for saying all this. In so disposing of another, he ought at least to make good his pretension to correctness, or at least to substantiate his claim to correct. He does neither; he only says "friction and other retarding causes would not prevent the rise of water to the same level as the head;" it would only lessen the quantity, he tells us. A Solon has spoken, but perhaps he will, before so confidently laying down the dicta of science, make the experiment for himself. I should advise "L." to make himself familiar with the laws of resistance in pipes before he attempts to correct others. In long pipes, I may tell him, the friction is so great, that, under some circumstances, there would be scarcely any flow at all. It has been stated by a celebrated authority that the head of water producing motion is divided practically into two parts by friction, one half giving the velocity, and the other to overcome the friction. Let "L." apply this to the case in question. But "L." has only to look at another reply, that of "G. W. T.," following his remarks in last week's BUILDING NEWS, which singularly corroborates my reply, and I might leave the question in pointing to so concise and good a corroboration. It may be as well to state that the friction is directly as the length of the pipe and the circumference or diameter of perimeter, and inversely as the square of the diameter; or the resistance is found to be as the square of the velocity. The mistake "L." has fallen into is in supposing the equilibrium of fluid to remain unimpaired.—G. H. G.

[3541.]—**Squints in Walls.**—At Battle, in the north nave-aisle, there is a similar loop high up in the wall; the splay is westward. There are circles in the chancel-wall of Folkestone Church.—MACKENZIE E. C. WILCOTT.

### STAINED GLASS.

DOLTON, DEVON.—The east window of Dolton Church has just been filled with stained-glass by Bere and Co., of Exeter. It contains in the lower compartment representations of Our Lord's Baptism, of the Good Samaritan, and of the Last Supper. Above are a central figure of Our Lord as the Good Shepherd, and at the sides the Twelve Apostles. The east lancet windows in the north wall of the chancel have been filled with stained-glass by Mr. W. Dixon, of London, and represents David playing on the harp. In the south wall is another window filled with glass by Mr. Dixon, and representing the Adoration of the Magi. Other windows are filled with stained-glass by Gibbs, of London, and Bere, of Exeter.

GLASGOW.—For some time past St. Andrew's Church, Glasgow, has been in process of redecoration internally. An important part of the work consists in the substitution for the plain glass windows of a series of windows in stained glass, the work of Messrs. Adam and Small, of St. Vincent-street. In each of the ten large windows the principal "motive" is a plant, such as



the vine, olive, pomegranate, &c. While the plant in each case is made to extend over the central portion of the window in tracery, the branches, leaves, and blossoms are treated somewhat conventionally, so as to preserve the idea of flatness. The prevailing colour in the central compartments is a light and bright yellow. In the upper rounded compartments the plant appropriated to the window is treated in bright points of colour. The borders are in quiet neutral tones, with narrow bright bands of primitive colour. Each window has at the foot a text. The designs in the windows under the gallery are more conventional in character, and the staircase windows, of which there are four, bear the emblems of the Four Evangelists. The general supervision was entrusted to Messrs. Salmon and Son, architects.

#### WATER SUPPLY AND SANITARY MATTERS.

**LIANDUDNO.**—The Llandudno Commissioners have accepted the plans of Mr. Baldwin Latham, C.E., for an extensive system of sewerage, with a gravitation outfall. The cost will not exceed £20,000, and the outlay will entail an addition of about 10d. in the pound to the rates. It is hoped that the works will be completed by the middle of next summer.

**WEST HAM.**—A deputation from the West Ham Local Board had an interview, on Thursday week, with the President of the Local Government Board in reference to the disposal of their sewage. Mr. Meeson (the Chairman) said they had had great difficulties in dealing with the sewage of West Ham. During the last two or three years they had spent about £8,000 in experiments for clarifying and utilising their sewage, but they had not succeeded. They had applied to the Metropolitan Board of Works in November, 1868, to be admitted into their drainage system, but had been refused on the ground that the Board of Works had not room. The West Ham Board felt peculiarly aggrieved at this, because, in 1872, the Hornsey Board had, by an Act of Parliament, been admitted into the Board of Works drainage system, the latter not opposing the application. Under these circumstances they asked for the assistance of the Local Government Board to get the Metropolitan Board to take West Ham into their drainage system. The President, in reply, suggested that they should renew their application to the Metropolitan Board, and in the meantime submit a written statement to the Local Government Board, who would do what they could in a friendly way to get the Metropolitan Board to consider favourably their application to be admitted into their drainage system.

**WINDSOR.**—At a special meeting of the Windsor Sanitary Authority, held on Wednesday week, it was reported that Mr. Kelly had declined the contract for carrying out the drainage works, and the Sewerage Committee recommended that the tender of Mr. Acock, of Oxford, for £17,000, be accepted. This was agreed to, and a committee of the whole Board was appointed to make all necessary arrangements.

#### LAND AND BUILDING SOCIETIES.

**ALTRINGHAM.**—On Monday week the annual meeting of the members of the Altringham Permanent Benefit Building Society was held. The eighth annual report stated that the steady progress which has attended the previous operations of the Society has been fully maintained in the past year. Advances amounting to the sum of £14,375. 0s. 2d. have been made in the year, which is an increase of £1,743. 16s. over the previous year. The total amount advanced on mortgage since the formation of the Society is £89,773. The profits on the past year's working amount to the sum of £457. 4s. 2d., which sum has been carried to the credit of the contingent fund, which now amounts to £949. 10s. 9d.

#### LEGAL INTELLIGENCE.

**ARCHITECTURAL PARTNERSHIPS.**—William H. Lynn v. Sir Charles Lanyon and John Lanyon.—In this matter the bill was filed by plaintiff, who, prior to the year 1873, carried on business in Belfast in partnership with defendants as architects, under the style and title of Lanyon, Lynn, and Lanyon, for an account of the partnership transactions from the 1st of January, 1868, and that the co-partnership might be wound up under the direction of the court. There was also a prayer that it might be declared that all professional profit from all work performed by the firm known as Lanyon, Lynn, and Lanyon from January, 1868, to July, 1873, should be declared partnership assets. Important points arising in the case are as to how far, on a dissolution of the partners, they are entitled to share in the profits of unfinished work which, by agreement, was placed under the control of one of the partners. On behalf of plaintiff it was contended that all the partners were entitled to participate equally in the profits of unfinished work. The defendants' contention was that the firm divided all the profits up to a certain point, and that the person who was appointed to carry on the work is entitled to the profits. His honour, in giving judgment, said in 1865 Sir Charles Lanyon appeared to have taken Mr. Lynn, who had been his apprentice, into partnership, and that partnership continued up to 1863, when Mr. John Lanyon, son of Sir Charles, joined the partnership, and articles were then drawn

up regulating the new partnership. In 1868 that partnership expired, and a new one was entered into, which was now dissolved, and the quarrels that had taken place were in consequence of the loose manner in which the partnership articles of 1863 had been drawn up—no provision having been made as to the way in which works in progress at the time of any dissolution should be dealt with. In 1868 the parties had not even taken the trouble of having new articles drawn up, but such partnership was carried on on the basis of the articles of 1863, as altered in pencil, subject to the qualification that the added memorandum was to be considered as part of the articles, and six months' notice of dissolution, expiring in January or July in any year, was substituted for the twelve months' notice required by the articles of 1863. The Lanyons, believing they had a right to dissolve the partnership at any time, served notice of dissolution on Mr. Lynn in November, 1871, but that gentleman, requiring six months' notice to be given to him, another notice was given to him in December, 1871, for the dissolution of the partnership in July, 1872; and when the dissolution took place each of the parties took different views of their rights as regards the works then in progress, Mr. Lynn contending that all such works should be brought into the account, while Sir Charles Lanyon thought the value of such works up to the date of the dissolution was all that should be accounted for. It appeared that in June, 1872, a circular was sent to the customers informing them of the intended dissolution, and asking them to choose whether Sir Charles Lanyon or Mr. Lynn should be the person to act for the future. His Honour then went into the facts at considerable length, and observed that he would preface his decree by stating that the partnership which was dissolved on 1st July, 1872, had been carried on since January, 1868, under the articles of 1863, as altered in pencil in the document furnished, subject to the clause No. 4 in the added memorandum. And the Court being of opinion that satisfactorily to adjust such accounts further inquiries were necessary, an inquiry should be directed as to the present state of the works in progress at the time of the dissolution, and by whom the customers wished to have same carried on, and under what terms and circumstances; also an inquiry whether the circulars sent out in June, 1872, to the customers were sent to the Ulster Hotel Company and to the Northern Counties Railway Company with the sanction of Mr. Lynn. The premises in which the business was carried on in Howard-street were partnership assets, and should be sold at such time and by such person, and under such conditions of sale as the Judge in Chamber should direct; and an inquiry should be made as to whom the furniture, &c., in the house belonged. As to the drawings, plans, designs, &c., with the assent of the counsel for both parties, he would suspend making any order in reference to such for the present, and would reserve the question of costs. An inquiry would also be directed whether any works were in progress at the time of the dissolution other than these mentioned in schedules 2 and 3; and if so, whether they had subsequently been carried on to a further stage, and under what circumstances. He implored both parties to pause, and consider carefully what they were doing, and what they would have to undergo under the inquiries directed, and whether some settlement could not be arrived at.

**INFRINGEMENT OF THE BRISTOL IMPROVEMENT ACT, 1847.**—In October, 1874, at the Quarter Sessions an appeal case was heard before the Recorder—brought by Mr. John Harper, millwright, of Bedminster-parade, Bristol, against the decision of the magistrates—who had convicted him in a penalty of 40s. and costs, for omitting to fix stone jambs and iron door to an opening in a party-wall. Mr. March, instructed by Mr. H. J. Brown, appeared for Harper, and Mr. Norris, instructed by Mr. J. G. Heaven (Clerk to the Improvement Committee), appeared for the district surveyor, Mr. Josiah Thomas. The facts of the case as stated in Court were these: Harper drew a door opening in a certain interior divisional wall, opening from a room on the ground-floor into a hauling way. The divisional wall divided the tenement into separate premises—there being separate doors and separate staircases—the said wall was also carried up through the roof and coped. The district surveyor requested that the said opening be provided with an iron door frame, and stone jambs, &c., the wall being a party-wall. On the opposite side it was contended that the wall was a divisional wall, that the house was only rated as one and numbered as one, and the builder was brought to prove that it was built for one, and therefore, the wall in question could not be a party-wall. On the first hearing of the case—the magistrates having viewed the site—Harper was convicted in the penalty of 40s. and costs. At the sessions, the Recorder confirmed the decision of the magistrates. The appellant to pay all costs.

**HALDANE ACADEMY OF THE FINE ARTS, GLASGOW.**—It is stated that this winter's course of lectures at the Haldane Academy, Glasgow, is to be given by Mr. William Simpson, of the *Illustrated London News*. Courses of lectures have in former years been given, as our readers will be aware, by Dr. Zerffi, Professor Kerr, and Mr. Alexander Thomson, the eminent Classic architect, whose lectures have recently appeared in the pages of the *BUILDING NEWS*.

## Our Office Table.

**IMPROVED SUSPENSION TRUSS BRIDGE.**—A patent has been granted in the U.S. to Mr. J. B. Bausman, for an improved Suspension Truss Bridge, in which the cables are made of wire, and semi-cylindrical in form. The chords are each of two sections of  $\square$  iron, placed parallel with each other, and confined together by a covering plate. The truss posts are confined to the chords, and are connected to the foot blocks by dowels, as are also the transverse stay-pieces. The cables pass through the foot-blocks, and are connected at each end with swivel or socket yokes, which connect them with the anchor bars. The side diagonal braces fit into lozenge-shaped recesses in the bottom of the foot-blocks, or slip over projections at the same points. The transverse diagonal braces are held in place by the dowels of struts. The posts and strut-bars are made of star iron, which form gives them remarkable strength, stiffness, and durability. With the exception of the tension-bars at each end, the cables are continuous throughout each span. Owing to the manner in which the lower connections are made with the foot-blocks, the trusses can be adjusted from the roadway, and the structure can be erected, when the same may be desirable, without employing substantial scaffolding, as is usual in the erection of bridges, the use of screw bolts being confined to points which are easily accessible.

**BELFAST ARCHITECTURAL ASSOCIATION.**—A meeting of this Association was held on Monday week. Mr. F. W. Lockwood read a paper on "Architectural Style." The lecturer, after addressing the younger members, applied to the practising architects to give their encouragement and assistance at the meetings of the Association. He then traced the history of the chief styles of architecture, showing that these always grew out of the special arrangements, and were adapted to the necessities of each particular time, and that we must follow the same principles now. Our architecture must be suited to the new requirements of the age, and be based on all the scientific knowledge of modern times; that we must beware of merely copying the forms of a past age, but must learn the great principles which are found to be in the good art of all periods. By honestly making use of every modern invention, and designing shops, warehouses, factories, and public buildings with special reference to the purposes they were intended to serve, and which purposes had never been known before, we should thus succeed in working out a new style of architecture quite distinct from any of the preceding ones. Mr. Disraeli had once proposed to hang an architect as the only remedy for the present unsatisfactory state of architecture, but he (the lecturer) hoped for better things; and if they were all earnest and intelligent in their studies, the architecture of England might yet once again become the glory of Europe.

**MANSFIELD ART CLASSES.**—The distribution of prizes and certificates obtained by the students for the work of the past session, took place at the Town Hall, Mansfield, on the 10th inst. The chair was taken by the Right Hon. Earl Manvers, who was accompanied to the platform by W. F. Webb, Esq., of Newstead Abbey, and other gentlemen. From the report of the master, Mr. J. Seddon Tyrer, it appears that the number of students attending these classes continues to increase; 52 students attended the evening class and 10 the morning class during the past year. The students succeeded in obtaining 28 Government Prizes, being an increase of 7 over the number of the previous year. Attention was called to the fact that the Mansfield students had during the previous year obtained the highest number of prizes of any "Art Night Class" in the kingdom, the results for the present year, as compared with other classes, not being yet known. His Lordship addressed the students at some length, advising them to persevere in their studies. An address was also delivered by Mr. J. S. Rawle, F.S.A., head-master of the Nottingham School of Art, in which some words of advice and encouragement were addressed to the students.

**THE METROPOLITAN BRIDGES.**—In pursuance of the resolution adopted last week by the Metropolitan Board of Works, a deputation, headed by Sir James Hogg, waited on Tuesday on the Chancellor of the Exchequer to submit a scheme for the freeing of the metropolitan bridges. The



amount required was estimated by Sir James Hogg at a million and a half, and the annual charge for interest and redemption would be equivalent to a penny in the pound of rating. It was proposed to provide this by extending the coal and wine duties expiring in 1889 another fourteen years. The Chancellor of the Exchequer expressed himself doubtfully on this branch of the scheme, but promised to consider the subject carefully, and bring it under the notice of his colleagues.

**PROTECTION OF WESTMINSTER ABBEY FROM FIRE.**—Last week the extensive alterations and improvements which the Dean and Chapter of the Abbey of Westminster have for some months past been carrying out for the protection of the Abbey from fire were completed and subjected to a test. Under the personal superintendence and from designs supplied by Mr. Thomas Wright, the clerk of works to the Dean and Chapter, a huge tank capable of containing 6,000 gallons (which will always be kept charged) resting on strong timber beams 18in. square, has been erected in the south-west tower, at an altitude of 160ft. from the ground. This tank is supplied directly from the main, which the Chelsea Waterworks Company has enlarged at its own cost, and pipes from this have been carried up the north-west side of the Abbey to the triforium level, passing thence through the roof to the south-west tower. Thence further pipes pass along the roof with hydrants and hose always attached at every point of vantage, so that at the first alarm of fire one man will be able unaided to turn on the water to any point of danger. A second series of pipes run from the triforium along the roof to Henry the Seventh's Chapel, at the entrance to which a stand-pipe has been fixed; both of these pipes have been fitted up with double hose and hydrants. The entire cost of the works amounts to upwards of £2,000, and from the test applied it was proved that without any aid from the fire brigade a continuous supply could be kept up for over an hour, and the pressure is of sufficient force to cast a full jet over the Abbey roof and also the lantern.

**A NEW IDEA IN TRADE UNIONISM.**—The operative plasterers of Brooklyn, New York, have recently formed a trade association, in which the workmen are classed according to their skill and industry. Instead of good, bad, and indifferent being massed together in one class, for which equal wages are usually demanded in strikes, there are three grades, rated as to wages according to the current prices for equivalent qualities and quantities or hours of work. The association pledges itself not to make a demand for increase of wages without giving three months' notice of its intention. It reserves to itself the right to take contracts for work to be done by its members on the co-operative principle. Thus, the individual member is to be allowed to decide for himself what he will do if the wages asked for by the society have been refused. He may either accept a lower rate or may use his influence to secure contracts for the society, upon which he can work in co-operation with his fellow-members until the employers, for want of workmen, raise the wages paid to them. The enforced idleness of an ordinary "strike," with the dependence upon the help of other workmen, may thereby be replaced by continual activity on the part of self-supporting strikers. Another resolution of the association pledges the union to work in harmony with plasterers who may not be members of the union.

**PERMANENT PROTECTION OF STONEMASONRY.**—We have several times—more particularly in the BUILDING NEWS of May 1, June 12, and August 14 of the present year—referred to the preparations manufactured by the Indestructible Paint Company for protecting stone and metal. Everybody knows that the most important consideration in connection with the preservation of stone is the length of time during which the protecting agent can be depended upon to defend the stone from the action of damp and the atmosphere. The Indestructible Paint Company have now at their offices samples of stone and other materials which have actually been exposed in the open air for periods varying from two to five years, portions of which have been indurated with their preservative solution and the remaining parts left in their natural condition. The contrast cannot fail to satisfy all who may inspect the materials of the thoroughly trustworthy character of the solution employed. The protected stone is as hard and homogeneous as on the day it was placed in position, while the portions of the same stone

left unprotected are in the same decaying condition as may be daily witnessed in any London thoroughfare. One trial seemed especially satisfactory in its results. The stone in question had been placed next the firebox of an engine for a period long enough to burn it into as strong a resemblance of a brick as a stone is capable of bearing; yet its surface was perfectly smooth and intact. The solution sold by the Indestructible Paint Company is perfectly colourless; it does not alter the appearance of the material to which it is applied; it prevents the growth of vegetation, and it is by no means expensive.

**PROFITABLE GASMAKING.**—The Manchester Corporation Gas Works for the year ending June, 1874, present the following facts, which will not be uninteresting at the present time:—The rentals for the past year show an increase of £23,240 upon that of the previous year, and the profits an increase of £13,862. The number of consumers has increased 2.62 per cent., amounting now to 65,979, as against 64,293 the previous year. On the credit side of the account for the year the gas rentals within the City amounted to £227,382, and beyond the City to £68,618. The coke realised £38,761, tar £12,242, and ammonia water £8,676, making a total of £335,681. On the opposite or debit side the coals cost £167,466, wages £26,577, maintenance of works and repairs to mains, &c., £24,206, salaries, £9,582, amount transferred to capital account for depreciation of works £22,849, making, together with sundry other small items, and a balance of gross profit of £77,465, a total as on other side of £355,681. The balance or gross profit of £77,465 is thus disposed of:—Interest on loans, &c., £18,861, amount transferred to capital account towards liquidation of mortgage debt, £28,977, surplus payable towards the cost of improvements effected in the City £29,626. According to the statement of assets and liabilities, there is a balance of assets in excess of liabilities amounting to £399,284.

**KITSON AND NAYLOR'S TELESCOPIC FIRE ESCAPE.**—We have pleasure in calling attention to a novel form of fire-escape which has recently been patented by Messrs. Kitson and Naylor. The novelty consists, first, in making the shoot of segmental telescopic portions (generally to the number of three) in such a manner as to allow the upper segments to slide into the lower when not in actual use, the whole affair thus occupying considerably less space than an escape of ordinary construction. A segment rack-catch and levers serve to give the desired elevation to the first length of the telescope, while endless chains, working on a windlass, actuate the other lengths and protrude them to the required extent. 2nd, in adapting to a second endless chain passing inside and outside the telescopic tubes a series of ledges, or bearers, by means of which only one person can occupy a given portion of the tube at any one time, so that as there are several of the divisions, several persons can be descending at once without injuring themselves or each other in their descent. As the descent is regulated by a brake, no injury can be sustained by a rapid fall. The motion of the endless chains being reversible, firemen, &c., can be sent up the tube in the same manner—a point of no little moment when the presence of a cool, collected individual in the proximity of people scared and half-dazed by a yawning gulf below, and a roaring fire behind them, may be of the greatest help in saving life.

#### CHIPS.

The *Chicago Times* says that the orders for iron shutters in that city are so great that all the factories are driven with business beyond their wildest hopes. Some of our English makers should go in for a share of the business.

The Candlish Memorial Committee have commissioned Mr. Charles Bacon, the sculptor, of London, to execute in bronze a statue of the late Mr. Candlish, M.P.

A memorial window to the late Bishop of Winchester is about to be erected in Bournemouth Parish-church by Messrs. Heaton, Butler, and Bayne.

The foundation-stone of a new Board school was laid at Ship-ton-on-Stour on Friday week. The cost will be £2,744. 10s. Messrs Bland and Cossins are the architects, and Messrs. Denner and Vokins, the builders.

New Board schools have just been opened at Strumpshaw, Norfolk. Mr. J. B. Pearce, of Norwich, was the architect, and Mr. Withers, of Blofield, the contractor.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHUTTING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB AND SON,  
Makers to the Bank of England,  
57, S. Paul's Church-yard, E.C.  
And 68, S. James' street, S.W.—[ADVT.] } London.

#### MEETINGS FOR THE ENSUING WEEK.

TUESDAY.—INSTITUTION OF CIVIL ENGINEERS. — "The Pennsylvania Railroad, with remarks on American Railway Construction and Management." By Mr. Charles Douglas Fox, and Mr. Francis Fox, M.M.Inst.C.E. 8 p.m.

ANTHROPOLOGICAL INSTITUTE. — (1). On "Skulls from Palmyra, with Notes on the Antiquities." By Prof. Dr. Busk, F.R.S., President. (2). On "Some Pæuvian Antiquities." By Wm. Bollaert, Esq., Corr. Mem. A.I. (3). "Report on Anthropology at Stockholm." By H. Howorth, Esq. An Exhibition of Stone and Modern Weapons from Costa Rica, by Col. Lane Fox, will precede the reading of the papers. 8 p.m.

WEDNESDAY.—SOCIETY OF ARTS.—On "School Buildings and School Fittings." By Mr. T. Roger Smith. 8 p.m.

## Trade News.

#### WAGES MOVEMENT.

THE PENRYN QUARRIES.—Mr. J. J. Evans, manager of the Dorothea Slate Quarry, which is one of the most profitable of the numerous limited liability undertakings in the Nantlle Vale, has been appointed working manager of Lord Penryn's extensive slate quarries at Bethesda, in succession to Mr. John Francis. Since the resumption of work, other important changes have been effected by Mr. Arthur Wyatt, who is the head of the quarries. Messrs. Morris and Owen Jones, the second and third managers, have resigned, and their example has been followed by several of the subordinate officials. The quarries are henceforth to be worked on a still more extensive system, and the number of men now employed there will shortly be increased by at least 500. The shipping port at Bangor still continues to present a deserted appearance, no slates having yet come down from the quarries.

## The Timber Trade.

The current wholesale prices for timber, deals, &c., are as under:—

	Per ton.	£	s.	d.	£	s.	d.
Bahia rosewood		12	0	18	0		
Rio		14	0	20	0		
Bahama satinwood		7	0	9	0		
	Per superficial foot.						
Italian walnut		0	4½	0	5		
Black Sea		0	3½	0	4½		
Canadian		0	0	0	4		
Cuba cedar		0	4½	0	5		
Honduras cedar		0	3½	0	4½		
Australian		0	3½	0	4½		
Pencil		0	2	0	3½		
Bird's-eye maple		0	5	0	7		
Honduras mahogany, cargo avge.		0	4	0	5		
Mexican		0	4	0	5		
Tabasco		0	5	0	0		
Cuba		0	7	0	10		
St. Domingo		0	7	0	10		
"	curls	1	0	2	0		
	Per cubic fathom.						
Petersburg lathwood		10	0	11	0		
Riga		8	0	9	0		
	Per mille of pipe.						
Memel crown staves		250	0	270	0		
" brack		220	0	230	0		
Canadian std. pipe per 1200 pcs.		20	0	22	0		
	Per 18ft. cube.						
Riga crown wainscot logs		6	0	6	15		
" brack		4	15	5	0		
Memel crown		4	15	5	10		
" brack		3	15	4	5		
	Per cubic load.						
Quebec large birch		110	0	130	0		
" " yellow pine		90	0	85	0		
Pitch pine		75	0	85	0		
Rock elm		160	0	160	0		
Ash		140	0	160	0		
Indian teak		220	0	280	0		
Riga fir		90	0	110	0		
Memel crown fir		90	0	110	0		
" best middling		80	0	100	0		
" common		70	0	80	0		
" undersized		55	0	65	0		
Stettin		60	0	70	0		
Swedish		60	0	65	0		
Norway and Swedish balks		40	0	55	0		
Memel crown oak		110	0	160	0		
" brack		105	0				
Quebec oak		160	0	190	0		
Dantzic crown oak		110	0	160	0		
" brack		100	0	120	0		



# THE BUILDING NEWS.

LONDON, FRIDAY, NOVEMBER 27, 1874.

## ARCHED BRIDGES.

BRIDGE architecture has been, since the introduction of iron, contending between the claims of straight lattices and tubes, and arched ribs and catenaries. In great spans the former are costly, if not impracticable, means of spanning a ravine or crossing a river. They are practically nothing more than the application of a simple girder in either of its two common forms—a single web or a tube, each requiring a certain depth and such an employment of metal plates or bars as will rigidly combine in one mass the two outer strings or flanges. Now the accomplishment of this requires a large expenditure of iron, in either solid plating or lattice work, of one kind or the other. Unless a rigid connection of the parts is effected, failure is inevitable—in fact, rigidity is an essential condition or requirement. From the very circumstance that the forces called into play in a girder are of a concentrated kind, requiring great resistances to overcome, it is evident they cannot be so economically met as in a structure where the tensile or compressive forces can be more directly resisted. In girder bridges the strains produced by a load must be of varying intensity—the load acts at right angles to the strains, which thereby also become indirect and excessively trying. And yet, with these disadvantages against the ordinary girder for large spans, the arched truss form of structure seems to have enjoyed little popularity among bridge-builders, and has grown very slowly and by spasmodic efforts into favour. Arched ribs are not new and untried. Where timber is abundant, as in America, various arched forms of bridges have been employed, and we cannot see any valid reason why iron should not be used with equal success. There are, we know, a few instances of its use, but they are exceptions, the straight girder and lattice principle having entirely become the favourite forms of bridge structure. A paper recently read and published in the Transactions of the "American Society of Civil Engineers" has called attention to the claims of upright arched structures over suspension and other trussed methods of construction, on the ground of economy. If economical considerations can be adduced in favour of the arched form, and we are inclined to think they can, it must take its fair position among rival systems. Let us briefly refer to timber examples. America has been foremost in adopting principles of bridge-building that, for daring, mechanical skill and economy, have been unsurpassed. They may all be considered as having sprung from the ordinary wooden trussed form. The bridge over the Delaware, at Trenton, erected by Mr. Burr, consisted of arches of timber, the middle ones being 200ft. span, and from these were suspended the roadway, the platform of which was further stiffened by cross-braces connecting the ribs with it. The bridge over the Susquehanna, at Columbia, is of a similar construction, and is the most extensive construction of the kind in the world; 29 timber arches, each of 200ft. span, and supported by 28 intervening stone piers, compose a structure over a mile in length. That over the Portsmouth river is another example, and consists of one rib 250ft. span on the laminated principle. Celebrated for its great span, the bridge over the Schuylkill, Philadelphia, designed by Louis Wernwag, must not be overlooked in

our examples of arched structures. A span of 320ft. was here attempted, consisting of trussed ribs with a versed sine of 38ft. The main ribs consisted of three double rows of timbers laid three deep and connected with wrought iron. The platform or floor of bridge was supported on cross girders, their ends resting on shoulders formed on the upright radiating posts to which the bracing was framed. A roof over the platform—a common expedient in American bridge structures, connected the upper ends of these king-posts, and served to stiffen the structure laterally. This great work of timber was destroyed by fire in 1838. All these timber-ribbed and trussed examples are highly important contributions to our knowledge of bridge construction. The lattice principle was early adopted in America, where it was introduced by Mr. Ithiel Town in 1835. For short spans the principle succeeded admirably, but the number of joints and the shrinkage of the timbers in long spans necessitated, in many instances, the addition of arched ribs on each side. Necessity here suggested the compound form in which the simple lattice is combined with the sustaining power of the arched rib. The "Improved Howe Bridge" is an adaptation of this principle, and also that known as Mr. McCallum's inflexible arched truss.

The instances we have noted show that the principle of the arched rib is not new, that it has been tried in timber bridges with great advantage and economy, and that our engineers, and all bridge-builders, would do well to consider it in the future application of wrought iron or steel for these purposes. But let us examine the reasons brought forward by the author of the paper alluded to. The effects of temperature upon the ribs of St. Louis Bridge induced the writer to consider the disadvantages of the system, and to suggest remedies. In that bridge a single rib is composed of two tubes placed 12ft. apart from centre to centre, and the lines of tubing are braced together by a single triangular system of bracing formed of bars secured to the tubes every 12ft. distant from each other throughout the length of rib, the bars being flat and placed in pairs one on each side of the tubes. An upper and lower tube thus braced together form one rib of the span. A segmental curve was adopted. The tubes are in 12ft. lengths, each length is straight, the joints forming angles of the curve. The effect of a rise of temperature (ranging from  $-20^{\circ}$  to  $+140^{\circ}$  F.) increases the length of rib about 6in., which causes the crown to rise, and with it the under tube to become relieved of its pressure against the abutments. This relief of the under tube or member of the rib brings the entire weight upon the upper tube, except at the crown, where the compression is reduced by the upward bending of the rib, and in consequence, at that point, the lower tube sustains the compression. Thus, at a high temperature, the upper tube at the abutments, and the under one at the crown, have to carry the load. It will be evident, therefore, the line of pressure passes through the middle of the rib at the haunches, where the compression is borne nearly equally by the upper and lower tubes. At low temperature, of course, this effect is reversed, the ribs having been formed for a temperature of  $60^{\circ}$  Fah. A greater depth of rib would have increased these strains arising from temperature, and have involved larger sections at the crown and the abutments, while in a rib of less depth the strains would have been proportionately diminished, but the rib rendered more flexible under unequal loading. Now these facts go to show in what direction the arched rib has failed, while they also show that the effects of temperature have compelled a larger employment of material or metal in the ribs than under other conditions would have been necessary. We all know the merits of the catenary in bridge-building, and its economical use under equally distributed loads. In simplicity,

cheapness, and elegance, indeed, no kind of rigid or braced structure can compare with it; its normal curvature is maintained by its own gravity. An inverted catenary, or an upright arch, is equally stable, and equally economical under a like condition of load; no bracing is necessary in either form to preserve its curve; while both can sustain the same load with an equal amount of material within the elasticity of the metal. Only when we have to deal with unequal loads does this system require bracing and entail greater cost. But let us look at other points between the catenary and arched rib and the girder systems. The catenary or suspension cable requires shore spans, towers, and anchorages; in the arched rib the extra section entailed by the shore spans does not exist, as we are justly informed. Again, Mr. Peter W. Barlow's remarks, published in 1860, on the Niagara Railway Suspension Bridge are quoted by the writer to show the advantages the metallic arch or catenary possesses over all truss systems. In these remarks, the opinion we have expressed at the beginning is corroborated. From a consideration of the ordinary arch, bowstring, and other forms of truss, Mr. Barlow concludes:—

1. "To convert an arch supported on two fixed abutments into a bowstring girder, four times the metal is also required to support the same weight with the same deflection."

2. "To convert a cable suspended from two fixed points into a Chepstow girder, four times the metal is required to support the same weight with the same deflection."

3. "To convert the same cable into a Saltash combination (which consists of a bowstring and Chepstow girder combined, so that the horizontal tie in one case neutralises the compression tube in the other, by which they are both avoided), the deflection is reduced one-half with double the weight of material, or the same weight of material will produce the same deflection with the same load, as in the case of the simple arch or cable. But this is obtained at the expense of double the depth; and if the arch or suspension cable was of the same depth as the Saltash, only one-quarter of the metal would produce the same stiffness."

Reference here is made to the bowstring and Saltash girders, but parallel girders are equally wasteful in the metal used. When, indeed, we know what forms constitute girders of uniform strength throughout their length, it becomes palpably stupid for engineers to adopt forms which require three to four times the amount of metal absolutely required. But let us resume. Captain Eads mentions the chief causes which have conspired to reduce this evident economy of the arch or cable:—1. The bracing required to preserve the form of the arch when unequally loaded; 2, the effect of temperature; and 3, the mass of masonry necessary to resist the thrust of an arch or the pull of the cables.

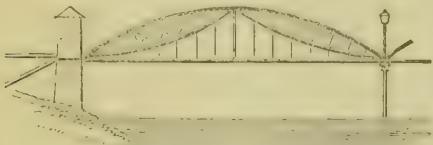
It is evident that a continuous girder suspended from a cable is subject to sinking in the loaded parts and elevations in the unloaded portions; these inequalities of strain are increased by the effects of temperature in the extension and contraction of the cables. To prevent these strains, it is proposed to cut the girder in two, and joint the cables to its ends at the centre of the span. Thus, the loaded half cannot deflect without causing a distortion of the cable which supports it. The half-cables are thus rendered rigid and independent of the other halves; in fact, each half-arch would be a truss in itself. These half-girders could be made to expand and contract at the towers. Reversing this arrangement, as in the upright arch, a similar girder power may be attained except that the connecting ties become struts. The longer struts in the latter case, however, would require to be of greater sectional area, hence the suspended arch has an advantage in economy of material. Beyond this, the expense of wind bracing, lessened in the case of the suspended arch,

\* "Upright Arched Bridges," by James B. EADS, C.E., in the "Transactions of the American Society of Civil Engineers," October, 1874.



would be in its favour, though, as the writer observes, the difference will be found to be less than supposed. The Szegedin braced arch bridge somewhat illustrates the principle here propounded of the half-girder system, which, however, is more economic than any method of spandrel bracing, because vertical struts and not braces are necessary between the half girders and arch. Again, the horizontal movement of the centre of the arch is prevented by the system of girder stiffening alluded to; and when the chords are placed under instead of over the arch, the struts between assist these two members, and further increase the resistance to horizontal movement of the centre, the chord becoming virtually a suspended cable. Thus, in the loaded half the strains are in tension; in the unloaded they are in compression, and the sum of the one will exactly equal the sum of the other.

Let us see the practical result of this method proposed by Captain Eads. The form is the upright arch with counter or inverted arches, which serve to prevent horizontal movements at the crown, while the suspended girder acts as a cable. The accompanying sketch shows



the form such an arched bridge would have. Taking a span of 500ft., with a steel arch, subject to compressive strains of 20,000lb. per square inch, the other members being of wrought-iron with 10,000lb. maximum strains and with 10 per cent. added for joints, it would be practicable to sustain a moving load of 2,500lb. per linear foot, while the superstructure, inclusive of everything, would only weigh 1,500lb. per foot. These results have all been derived from careful calculations of the weights of the span from detail drawings, and the strains arrived at from the same weights and variously-proportioned loads. These figures certainly indicate the merits of the arched system over the ordinary trussed girder, and the results are due:—

"1. To the fact that strains from temperature are eliminated.

"2. By combining the arch and cable great depth of girder or bracing is obtained.

"3. No struts longer than one half the versed sine of the arch are required, and but few that long. Hence a greater versed sine or rise of arch is practicable.

"4. Every disturbance of equilibrium, however slight, brings every member of the structure into play to resist it."

The author proceeds to show the merits of this system of bracing over the methods of stiffening suspension-bridges, while it avoids all inconveniences arising from temperature, and by combining these advantages, the cost for long spans is "wonderfully reduced compared with the most economic truss system yet devised. By any method," he says, "of girder construction hitherto known, it is impossible to span a clear opening of 500ft. with less than three times the dead weight of the arch on the proposed system, with equal strength of girder, and with the same material and allowable strain." Various details, specially interesting, are entered into by the author which our limited space forbids our entering into. These we will reserve for further remarks.

#### SOME NOTES ON THE EFFECTS OF MOISTURE AND WARMTH ON TIMBER.

ONE of the most active causes of decay in timber is the alternation of the effects of dryness and moisture. The decay of ships in warm climates must be placed to this cause; and by the effect of warm moisture,

close cellars, unventilated, where the air is more or less filled with vapour in a stagnant condition, decay is greatly accelerated, and not unfrequently dry-rot ensues. Another hastener of decay in wood is due to the bad but common practice of painting it before the evaporation of the moisture contained in it has taken place; and yet we find builders and others over-careful that new woodwork should be painted as soon as possible. Such precaution for arrest of decay often proves of contrary effect. If we examine any old unpainted woodwork, such as we see in our old farmhouses, halls, and churches, we shall discover it perfectly sound and hard after the lapse of a century or more; while an examination of painted woodwork of a comparatively recent date will show unmistakable indications of decay, if not serious inroads of the dry-rot. We would here remind architects and those engaged in furnishing houses to pause before they lay their new floorcloths, or paper their walls. Let the moisture be thoroughly evaporated before they unconsciously or unknowingly seal the fate of the speedy decay of their floors and furniture. There is a good deal of what we may call "genteel ignorance" manifested among people who would indignantly resent the idea that they were ignorant of common things. Floorcloths are among the first of the household comforts Mother-familias desires; they go down in all haste, and the consequences are not apparent till the discovery is made that the carpet or cloth is remarkably rotten. But by retarding the free evaporation of moisture, floorcloths of all kinds are great helpers of decay in the floors themselves. Painted floorcloths, and those impervious to wet, are especially so. It has been asserted on reliable authority that wood, when exposed to a certain degree of moisture, and at a temperature not much under 45 degrees nor too high to evaporate suddenly all the moisture, gradually decomposes. In chemical language this decomposition is called putrefaction; it proceeds rapidly in the open air, though this is not absolutely necessary. Certain gaseous matters are given out, chiefly carbonic acid and hydrogen gases, on the authority of Dr. Thomson, in his "System of Chemistry." Sir H. Davy observes that "any process that tends to abstract carbonaceous matter from woody fibre must bring it nearer in composition to the soluble principles," and this is done by fermentation. Sapwood, on this account, is more perishable than heartwood, as it contains more saccharine and fermentible matter. Duhamel ("Transport des Bois") found that paint and tar contributed greatly to the durability of dry or well-seasoned timber, but hastened the decay in green and unseasoned timber. We may notice another destructive practice common with builders (we will not allude to speculative builders, for durability with them is a very unimportant element), viz., bedding timbers, themselves wet, in walls exposed to damp for a considerable time. Now quicklime hastens decomposition when assisted by moisture, in consequence of its abstracting the carbon, but wood perfectly dry is not affected injuriously by dry lime; old plastering attests the truth of this. Plastering-laths will always, in dry places, be found to be sound; lime also protects the timber from the worm. Mild lime (carbonate of lime) has not the effect of injuring timber, but this state is not reached by mortar for a considerable time. It is also stated that volatile and fixed oils and resins are also susceptible of decay, though to what extent appears rather doubtful; resinous timber, therefore, is not safe under the conditions we have named.

Decay sometimes commences in the tree at the heart, after a certain age; and in large balks of timber, such as are required for girders, it is not uncommon to find a rotten heart or traces of decay at the core. Tredgold informs us that yellow fir girders which have appeared sound on the outside have

shown rottenness on removing building joists, and recommends the plan now judiciously adopted, of sawing the girder in two and bolting.

Wet-rot and dry-rot are two of the best known of the diseases to which timber is subject. Chemically, the same causes produce these phenomena. Wet-rot is determined simply by the condition of a free evaporation; dry rot by an imperfect evaporation or a confined situation. The first may take place while the tree is standing, the second when wood is dead. The dry-rot is a well-grounded source of alarm, and when once the germs of the disease have shown themselves, the ravages it makes are often beyond control and defy remedy. When the sap of wood has never been evaporated, dry-rot becomes an internal disease. This is often the case in beams when only the outer part has been seasoned. A fine, thread-like vegetation, uniting in a thick, fungous coat at the end, is noticed. The fungous growth, for it belongs to the order Fungi of the Cryptogamia class of plants, often appears to cover the sides and ends of timbers with a fine white and delicate vegetation or mildew. These delicate ramifications collect, have the appearance of hoar frost, and spread in thick, fern-like patches over walls, woodwork, stone, and plastering. We have seen the wall of a drawing-room, with floor underneath, covered with this fungus-like vegetation, and paper and paintwork have both been subject to its depredations. The colour is generally greyish, yellowish, or brown. Wood subject to this disease contracts in length and resembles charred fibre, and the rotten parts crumble into a fine powder. A barn floor laid only twelve years is recorded to have been found quite rotten, the planks, 2½in. thick, were eaten through, though the surface remained as a thin skin, concealing an internal state of impalpable powder of a snuff colour.

In laying bond timbers, as wall plates, they should be laid not at the inner surface, as usually done, but in the middle of the wall thickness, so that the brickwork on each side should take the weight of wall above. A free circulation of air round the ends of all wooden girders and timbers is necessary to insure freedom from decay. Road scrapings, instead of clean sand, are often used in the mortar for bedding timbers, and such refuse creates active decomposition. To cure dry-rot we should first provide ventilation to all timbers by cutting off access of moisture, then cut away all diseased parts and remove every trace of fungus by brushing the surfaces treated with some solution. Sir H. Davy proposed corrosive sublimate, 1oz. to every gallon of water, and laid on hot. Kyan's process is practically the same. Sulphate of copper is considered a good remedy, the solution being about 8oz. to a gallon of water. Oil of tar has also been highly spoken of as an excellent wash for timber infected with dry-rot. We have not space here to notice other remedies to which we may return; in the meantime the subject of timber preservation is a most important one, and demands a greater share of attention from practical chemists and those connected with building operations than it has had. "Prevention is better than cure," and the causes of speedy decay we believe are attributable to the neglect of common precautions, which are in the hands of every builder, architect, and engineer.

#### HISTORIC ART STUDIES.

FRENCH, ITALIAN, AND ENGLISH SCULPTURES, NINETEENTH CENTURY.

(With double-page illustration.)

THE French, Italian, and English Sculptors of modern times form a group in themselves, with characteristic evidences of the distinctive elements in their national education. The French are sensational, the



Italians mere copyists, and the English are timid. In France, a false imperialism created an affected pathos. In Italy, the past crushed the energy of the present; and in England a misunderstood piety, which often degenerated into Puritan bigotry, dwarfed every higher artistic attempt. The outlines of the French are always calculated to bring out the sensuous most prominently; the outlines of the modern Italian sculptors show a painful striving to be correct; and the English show a prudish anxiety to be as modest and cold as possible. The French generally excel in technical execution, but they are often too refined and mannered; their compositions in marble are more pictorial than plastic, whilst in their paintings they commit the opposite mistake, and sacrifice the harmony of their composition to the "pose." There is a marked tendency in French sculptures to individualise; but this is done without any regard to the higher laws of idealisation, productive of intensity of feeling, depth of treatment, and elegance of style. We find, however, in their works energy, a powerful imagination, and originality of grouping. Our illustrations amply bear out these generalisations. We have first (see Fig. 1) the pediment of the Chamber of Deputies at Paris, decorated by M. J. P. Cortot (b. 1787, d. 1843). The protecting divinity of France holds in her hands a tablet, bearing the words "Charte, 1830," on her right sits *Might*, and on her left *Right*—a most characteristic epigram expressing briefly the French State idea, that might is always right where France is concerned. Under the protection of *Might*, we have Architecture, Sculpture, Poetry, Painting, Commerce, and agriculture; and to the left we see *Right* supported by the representatives of War, Law, Engineering, and Navigation. Never has an artist so clearly reflected the social and political state of France as M. Cortot. "Light Poetry," meaning licentious poetry (see Fig. 2), by James Pradier, a Swiss (b. 1790, d. 1852) undoubtedly shows great talent and fantasy. His lines are swelling and truthful; the marble lives, but he touches our senses rather than our minds; his figures are without the softening purity of thought which we admire in the Greek statuary of the Classic period. Quite in an opposite direction worked P. J. David (of Angers) b. 1793, d. 1856. He began with conventional imitations of the Antique, like his brother artists, but soon sacrificed everything to a bold and reckless naturalism. He despised the laws of æsthetics, and imitated with slavish accuracy what he saw. This made his statues stiff and coarse. He was a portrait-sculptor, and we give as a specimen his statue of Matthieu de Dombasle, a celebrated agriculturist of Nancy. Better in composition and style is Charles Simart's "Orestes" (see Fig. 4). The unhappy hero is represented at the feet of the altar of Pallas Athénè, despairingly seeking help and protection. At the Paris Exhibition of 1840, this statue was one of the great "events" of the season. Olympia, by Etex (see Fig. 5), and Andromeda, by J. Lescorné (see Fig. 6) are the very best specimens of the French treatment of Classic subjects. Andromeda is not the beautiful and hopeless daughter of King Kepheus, chained to a rock to be devoured by a sea-monster, but a modern French lady showing proudly her womanly charms to the best advantage; the same may be said of Olympia. We cannot deny the masterly elegance of the waving lines in these compositions, more especially in the Olympia, nor fail to perceive a passionate enthusiasm for the treatment of female beauty. Bold and wild in composition, licentious in thought, and daring in execution, is the group by A. Courtet, "A Faun and a female Kentaur" (see Fig. 7). The arrangement is tasteful, and the details are worked out with great care. The whole is more in the spirit of the Renaissance than the Classic style. We remarked in the Teuton sculptors simplicity and correctness, whilst

in the French we trace a powerful imagination, which is inclined, however, to be too sensual and theatrical. The Belgian sculptors approach far nearer to a better understanding of the Antique. The "Amorous Lion," by W. Geffs (see Fig. 8), a pupil of the older Ramege, at Paris, is undoubtedly a very meritorious group. It attracted considerable attention at the London International Exhibition in 1851. The grateful and affectionate lion is admirably rendered. The lines of the whole are both noble and tasteful, and full of ideal beauty. The statue of Godfrey of Bouillon, by E. Simonis (see Fig. 9), is a good monumental composition; it is executed in bronze, stands on the "Place Royale" at Brussels, and represents the inspired Crusader in the act of holding aloft the banner in fanatical enthusiasm, and crying, "God wills it," to his companions in arms. The horse is a masterpiece, and the whole monument dignified and full of expression. "Cupid Caught," by C. A. Fraikin (see Fig. 10), exhibited in London, 1851, is a group conceived in a naturalistic spirit, tempered by an assiduous study of the Antique. The artist's idea is far better than the execution.

Turning to some modern Italian sculptors, we are immediately struck by their sterility of conception. We see nothing but copies of ancient originals or imitations of the compositions of Canova. Though we find a certain amount of correctness and refined delicacy in the reproductions of the human form, we must at the same time observe too great a leaning to sentimental softness, or, more colloquially, to sculptural "namby-pambyism." Canova undoubtedly exercised a beneficial influence on the modern schools of art in Italy. The technical treatment of marble has been most carefully studied, but has led, as it too often does, to pictorial "clap-trap" and sensationalism in stone. One of the most talented sculptors is Pietro Tenerani, a pupil of Canova and Thorwaldsen. We give a sketch from a tomb erected in memory of a young English lady (see Fig. 11). The group is full of tender feeling. The husband bends over his dying wife, who lies on a couch, and is approached by the Angel of Death holding an hourglass, the sand of which has run out. The composition is carried out in the Classic style, with almost painful correctness; the folds of the garments are well arranged, but there is very little originality in the grouping. The statue of Cupid (see Fig. 12), by Carlo Finelli, is graceful, though to a certain degree affected. The God of Love holds a butterfly in his hands, and appears to revive the emblem of Psyche by breathing love into it. The wings and the head are too large, and disturb the harmony and proportion of the figure, which is too slender in the feet. The work itself is executed with all that delicacy of touch for which the Italian school is so celebrated. It is now in the rich art collection of the Duke of Devonshire, at Chatsworth. The statue of Galileo, by Emilio Demi (see Fig. 13), is worthy of the best period of antiquity. Like Sokrates, the great philosopher is seated, wrapped in a large cloak or toga, the earth as a sphere in his hand; his gaze is directed to heaven, as if inspired by the heliocentric truth in opposition to the dogmatic geocentric assumption; his lips are half-opened, as though they uttered the immortal words "E pur si muove." The treatment is free from all exaggeration: natural, but at the same time not wanting ideal loftiness in the composition. Innocenzo Fracaroli entirely devoted himself to the reproduction of Antique and Classic subjects; he lives in the wondrous myths of the Greeks and Romans. As an example of this, we give his statue of Achilles wounded in the heel by Apollo's arrow (see Fig. 14). The subject was not an easy one, and yet it has been treated with masterly power. Motion and repose are brought into perfect harmony. The hero appears suddenly stopped in his course—horror, pain, and despair are shown in his facial lines, and in his whole

body. The limbs seem paralysed by the feeling of approaching death. We see a mighty frame broken by the unexpected force of inexorable fate. Though the subject invites exaggeration and theatrical affectation, the artist has kept within the strict boundaries of moderation and simplicity. His statue is nearly equal in perfection to the very best works of that later period of antiquity when bodily sufferings were the cherished themes of Græco-Roman art. "The Vestal," by Monti, (see Fig. 15) is one of the most objectionable products of that pictorial sensationalism which we feel it our duty at all times to condemn. The first mistake of the artist was to represent the Vestal in a kneeling, or rather crouching, position, contrary to the Ritual of the Romans; thus associating a Christian, or rather Brahmanic, posture with Roman rites. The holding of the sacred fire is also an arbitrary innovation, as the Vestals had to watch over the eternal fire burning on the altar, and not to carry it about. The neatness of the execution deserves all praise; the marble was turned by Monti into a thin, transparent tissue, and the drapery is admirably laid on. As a sculptural "tour de force," the statue created a sensation at the London Exhibition of 1851, amongst those who admire artistic tricks more than simplicity and æsthetical correctness. It is in the possession of the Duke of Devonshire, who deserves great credit for the kind and generous patronage which he is always ready to extend to artists, whether native or foreign.

We next come to the consideration of some English sculptures. Many pessimists are to be found amongst us who despair of our ever possessing real sculptors; who think that neither our climate, nor our mode of living, nor our bodily construction, is favourable to the production of artists and genuine works of art. We linger behind other nations, though there was a time when we were far in advance of them—in poetry, through Shakespeare; in philosophy, through Bacon; and in æsthetics, through Shaftesbury, Hutcheson, and Reid, who were the founders of the study of the "beautiful" in art, from an idealistic as well as realistic point of view, and served France and Germany as the basis on which all the modern theories have been built up in the realms of imagination and emotion. We have turned our backs contemptuously on these "talkers," as some of the purely practical workmen in art might say, and have given ourselves up, body and soul, to materialistic realism and realistic naturalism. We have excluded art and artists, in a Hebrew-Egyptian spirit, from our public life; looked down upon them as useless idlers, who dwell in the regions of abstraction and fantasy, instead of respectably sitting at their ledgers adding up interminable columns of £. s. d., in order to show a considerable balance at their bankers' at the end of the year. We have, with systematic bigotry, neglected the culture of art, from an æsthetical and ethical point of view, in schools, in our homes, and in public buildings, and are astonished to find ourselves compelled to imagine we have an admirable and peculiar art of our own, which, however, real art critics do not recognise as the very highest standard, but consider an art full of anachronistic errors; an art asymmetrical, sickly, symbolic, meagre in thought, and deficient in higher aspirations. If, in spite of these shortcomings, we were still able to produce a Flaxman, a Gibson, a Macdowell, a Wyatt, a Westmacott, or an artist like the late Mr. Foley, we might in reality be perfect Titans in artistic power. Our climate might prevent our appreciating colours, or lead us to prefer primary to secondary colours, or to admire glaring, incongruous juxtapositions, but it is undoubtedly fitted for bronze, and even marble, statuary. We have numbers of town-halls, courts of justice, reading-rooms, libraries, universities, colleges, mansions, &c., and are horrified with bare walls, or here and



there startled by the badly-carved bust of some founder who gave so many pounds and shillings for the promotion of the study of of some antiquated and unintelligible hypothesis or some practical technicality rendering money-making easy. Not one farthing has, in the ordinary way, been spent for the higher culture of the mind and its poetical faculties: imagination and taste. No prizes for the study of universal history, the painters' inexhaustible storehouse of subjects; no prizes for essays on æsthetics or art history; and still we may boast of artists who, in spite of our neglect of mental culture, have dared to oppose the deadening influence of a Hebrew-Egyptian spirit, which was shocked at a carved image or a painted window, a decorated wall or the tastefully turned leg of a table, and have produced perfect masterpieces. Their shortcomings are often but the shortcomings of the spirit of the times that surrounded them with a thick atmosphere, checking all higher artistic aspiration. The "Waking Dream," by Mr. P. Macdowell (see Fig. 16), is an excellent work—chaste, tender, and lovely in the outlines, reminding us of Canova's treatment of marble. In saying this we mean to praise the work, not to insinuate that it is an imitation. The beautiful girl is deeply lost in thoughts which, in spite of her being awake, are more like fleeting dreams of future happiness. There is much ideal poetry in the very conception of this statue. Mr. John Gibson, a pupil of Canova and Thorwaldsen at Rome, may be considered the best representative of English sculpture after the immortal Flaxman. It is greatly to be regretted that so little scope is left to this branch of art, and that artists are often forced to devote themselves to the production of smaller genre works. His "Amor with the Butterfly" (see Fig. 17) is far superior to Carlo Finelli's theatrical statue of the same subject. The outlines are harmoniously beautiful and refined, and the god of love bears the most charmingly idealised features. Exquisite in composition and execution are the two figures from the tomb of the Duchess of Leicester, by this sculptor, in the church at Longford, in Derbyshire (see Fig. 18). A fairy-like angel bears a new-born child away, and also leads the mother to the land of bliss and peace. The drapery is in the very best Classic style. The "Happy Mother," by Mr. R. Westmacott (see Fig. 19), who received his artistic education at Paris and Rome, is a simple group, full of tender expression and truthfulness. The drapery is rather too heavy, and some of the lines are stiff and affected. The group is paired with another called the "Unhappy Mother." The colossal "Achilles" in Hyde Park, executed in a thoroughly Classic style, is by the same artist, as also are statues of Fox, Pitt, Canning, &c. He distinguished himself in all his works by truthfulness and a deep poetic feeling. The touching story of Odysseus being recognised by his old half-blind dog has furnished Mr. L. Macdonald with the subject for a marble group of great pathetic power (see Fig. 20), which is in the possession of the Earl of Kilmorey. R. J. Wyatt was one of the best sculptors of our times in the delicate reproduction of female beauty in marble; there is an exquisite tenderness in his outlines which reminds us of Flaxman and Canova, who undoubtedly inspired the artist to emulate their genius. Musidora (see Fig. 21), a young girl either leaving or about to enter a bath, anxiously and furtively looking whether any one can see her—is a charming statue. The upper part is rather too slender in proportion to the figure, a fault which the artist ought to have avoided, as it gives too sensuous an aspect to the work. Mr. J. S. Westmacott has executed for the House of Lords a statue of Saher de Quiney, Earl of Winchester (see Fig. 22). He gives us with great fidelity and minuteness the costume of the thirteenth century, and has conceived his

statue in a dignified and highly characteristic spirit.

Were we only to encourage sculptors as we encourage the improvement of poultry and cattle-yards; were we to give prizes of £1,000 in silver cups, goblets, decanters, salt-cellar, &c., for good works in terracotta, bronze, and marble, as we do for fat rabbits, geese, ducks, pigeons, cows, cats, and oxen, we should soon be able to convince ourselves that there is an abundance of sculptural talent amongst us that waits patiently for the sunshine of public appreciation to bud, to flourish, and to produce sweet fruits.

The group of Antilochus defending his father, Nestor (see Fig. 23), by Don José Alvarez, who studied at Paris and worked at Rome under the influence of Canova and Thorwaldsen, belongs to the same school as the above-mentioned English sculptors. This group, now in the Museum at Madrid, represents the heroic Antilochus defending his old father against the attacks of Memnon. It is, in general composition, as in all its details, a masterwork. The anatomy is not too prominent; the lines are soft, and form one harmonious whole. The group "The Panther Hunter," by Jens Adolph Jerichau, a Dane (see Fig. 24), is full of energy and characteristic expression; whilst the group by A. Kessels, "A Scene from the Deluge," is, in spite of its masterly execution, rather theatrical in the disposition of the figures. A husband drags his fainting wife to the top of a pointed rock; a charming child clings to her, which, if it were not of marble, and well attached to the mother, would undoubtedly slip into the abyss below. This thought is in itself enough to disturb the artistic effect of the whole composition. We cannot but observe that Kessels, notwithstanding his great power in the treatment of marble, and his having studied under Thorwaldsen at Rome, never could rid himself of the sensational impression he received in his earlier youth at Paris, where he first received instruction. G. G. ZERFFI.

#### HINTS TO STUDENTS.—I.

EVERY student must have found it difficult and irksome at times to kindle and sustain an interest in a subject naturally antipathetic to him; for instance, to turn his mind readily and agreeably to a topic repugnant to his accustomed frame and habit of mind; and this feeling of repugnance grows, and takes so strong a hold of him, that the application becomes a Herculean effort. So hard is the task, indeed, that minds of sensitive natures and strong feelings are wont to give up the effort, and be led captive by the siren influence of passion or feeling into a kind of enthusiasm which shuts the eyes and turns a deaf ear to all save that region in which their interests centre. It is a singular comment indeed, but the architectural profession is the only one among its sister professions in which such opposite faculties are called into requisition. The artist in the sister occupations of Painting, Sculpture, and Music, has only to gratify their full bent the imagination and feeling that prompt him to work out on canvas, in marble, or to realise in melodious measure the ideal of his desire; the scientist, and every other profession, has its confines strictly marked, while within those limits the mind never feels weary or ill at ease. To point to such names as Stephenson, Faraday, or Tyndall, is to point to minds thoroughly in accord with their work in its every phase; avocations in which the mind can wander, and pass from one stage to another in sequential order, and with unconstrained desire. The most fundamental steps are so strictly consonant with the ulterior objects that they may be said to be merely the beginnings of continuous chains of reasoning and research, the horizon of interest merely receding at each step in advance. But the architect belongs to a sphere of his own

making. He has to appropriate to his special purpose a variety of subjects as contradictory as it is possible to find. There seems to be no order or connection in his study; no coherence: he steps out of practical dry mathematics into the dreamland of æsthetics, from commonplace pounds and pence to sentimental reveries in archæology and style. From the technical to the æsthetic is a great leap, and the transitions are quite as abrupt in all the special branches of his calling. It is very natural, therefore, that the young student destined for this profession should be inclined to be rather partial to some branches and neglectful of others; and this is a propensity very common among architects: great power of draughtsmanship is frequently accompanied by no power at all in constructive technical ability. They appear to the student unaccustomed to the profession as wide apart as the Poles; and the idea that they must be combined scarcely enters the head of the young enthusiast, deeply intent upon sketching all the ruins and quaint nooks of his locality. Such an idea seems too remote for a moment's reflection, and he does not allow so unwelcome a thought to enter the Arcadia of his undisturbed notions. It is only when stern "practice" bursts upon him, in all its reality, that he begins to wish his Colenso or Walkinghame had been more studied, his Euclid a little more precise and practical, his mathematics or physics more at his fingers' ends, instead of fleeting visions of Mediæval abbeys and ruined cloisters. Then, again, our student has a dread contempt for anything like practical details. The technic mysteries of the mason's banker or the joiner's bench appear utterly opposed to all his dreams of fancy sketch-book life and paper theories. Yet he feels the increased power and facility such an acquaintance with the technical workshop would bestow. In designing his stone details, or his joinery, the knowledge of joints and beds, rebatings, groovings, and other minutæ of the craft, gives him a felt grasp over his work which no other kind of learning can afford. But to turn the accustomed habit of the mental faculty is as hard as to acquire a relish for a disliked diet. Every student is preoccupied in his own habits; it is natural, therefore, that the ordinarily prescribed modes of study are not only distasteful, but can have little direct benefit in the absence of a relish. It is like compelling a man to take a prescribed diet which he loathes, or which his digestion is unprepared for. All medical men will tell us that the diet which the patient most desires is the best and most assimilable. Courses of study which prescribe opposite mental regimen are equally objectionable, though it seems hardly to have entered the heads of preceptors to combine the ingredients of study, or to present the pill in the least objectionable form, or with some palliative. Now in these Hints we propose to show how students engaged in the arts may turn subjects for which they have great antipathy into profitable stimulants of thought. Let us first consider what those studies or branches are which are generally acknowledged to be conflicting, or wanting in congeniality. Taking mathematical study as the basis, and one which is, *par excellence*, connected with architectural science and construction, we find the consideration of magnitudes, ratios, either geometrical or numerical, especially adverse and irreconcilable to studies such as fine-art compositions, decoration, and all work in which imagination is chiefly engaged. Again, science—the investigation of properties, as the forces and laws of matter, chemistry, and other branches of physics, seem directly opposed to the spirit of archæology, or the history of fine-art productions. These are the great antipathic subjects; and if we can combine in each study some portion of that one for which the student has an antipathy, so as to present the subject in the most attractive manner, and at the same time make it eminently suitable and practical, we believe the difficulties we have alluded to will be removed. The existing works on architecture, placed in the hands of students, are notably defective in their teaching



power. For example : we have treatises on styles without giving a word of the reasons which brought about such styles (Mr. Fergusson's Handbook is, in many points, exceptional to this remark); no comments of a technical nature are afforded as to materials, knowledge of statics, manufactures, working in stone, metal, and wood, all intimately bearing upon the development of each style. The student in quest of these desiderata must have recourse to other treatises on these specific topics to thoroughly grasp the influences and causes which together led to any particular mode of architectural construction, for nothing of the kind is hinted at, and the learner is led to the assumption that architectural styles were so many fortuitous fashions. In books of designs, with which we are literally overwhelmed, treating of no end of specialities, e.g., villas, cottages, churches, monuments, fictilia, wood-work, carving, fittings, metal-work, ancient and modern, the writers seldom present the subject scientifically, that is, in a way suitable for the professional student; no preface is given treating of the principles involved in the designs; but the student must seek such elsewhere. Elsewhere he looks, but the writers are not artists, and no allusion is vouchsafed of the application of principles inculcated. Thus, between art works which give nothing but designs, and scientific or technological works which do not descend to illustrations, the student in search of reliable manuals on different topics of his art is forced to content himself with an imperfect gleaning from books by specialists, good of their kind, but defective in teaching power. We do not mean to say in the domain of Art alone is this the case, but we think it is a serious hindrance to efficient art instruction. A few solitary attempts in educational works have been made—Lockwood's and Cassell's educational works in particular; but the most valuable teaching power has undoubtedly been the weekly press, or at least that section of it which has devoted a large share of its space to something better than mere ephemeral literature, and has learnedly and well aided young professionals in principles as well as in giving them examples of actual experience; and we may say it without hesitation, that the BUILDING NEWS has been foremost in this direction. Now nearly every branch of architectural knowledge may be divided into the tectonic and the artistic, the former embracing its own correlative sciences or principles. At present we study these two divisions apart and separately. But why should they not be studied together, as far as possible? The French and German systems of teaching are far better in this respect; the technology of the fine arts becomes a more inseparable part of teaching than it does in our system. In carving, for example, the tools, the materials, and the mechanical aids and rules are taught simultaneously with the fine-art power of design. Not that the instruments of execution can give the art-feeling, but they serve to give direction and manipulative power. In every kind of architectural work constructive methods enter; in designing a doorway or a ceiling, various geometrical or mechanical conditions necessarily demand solution before the imaginative process of design can be entertained. Now, if the problem in either case was considered in its geometrical, constructive, and decorative aspects or totality, the study would be vastly more beneficial, while the result would be far more perfect as a work.

In this endeavour of showing how each special branch of art-study may be facilitated by being brought into correlation with its mechanical and practical functions, we will devote a few observations in future articles.

#### THE ULTIMATE TYPE OF LONDON BOARD SCHOOLS.

THE London School Board in commencing operations could not, from the nature of the case, derive much advantage from either their own experience or that of others. They

had to provide a large number of structures totally different in character from anything heretofore existing, in the nature, extent, and relative positions of the accommodation to be provided.

In buying, or creating, experience they adroitly invited sets of designs and plans from as many architects of repute as were willing to enter the lists as competitors for the first schools built. The large number of designs sent in by competent men furnished the Building Committee of the Board, and their architect, with a repertory of practical ideas and suggestions of greater or less value bearing on style, structure, and internal arrangements. In like manner, in carrying the designs into effect, in the erection of the schools first built, they have acquired, unless they are very dull scholars, a considerable amount of knowledge as to such ideas as are worth following, and others that are to be shunned; they should be already, in the forty schools built, well-furnished with both guides and beacons. The fact that competing designs are not to be invited for any of the forty schools, or thereabouts, that have still to be erected, implies that the Board is of this opinion also, and satisfied with the degree of knowledge wherewith competing architects have already furnished them withal.

It has been erroneously said, concerning the new Board Schools, that "they are all alike." No one who has noticed the external appearance of a few of them, or who knows anything of their internal arrangements, can subscribe to this thoughtless dictum. The varieties in the one are very numerous, and in the other there are differences of essential importance. The Board Schools remaining to be built cannot be of one absolute ultimate type as regards either plan or style. The size and form of the site must necessarily govern the one; the locality and the character of surrounding buildings ought to have their influence in deciding the other. In so far as internal accommodation and arrangements are concerned, however, the experience acquired from the schools already built suggests certain provisions that should be, as far as possible, common to all new schools hereafter to be provided.

Leaving style out of consideration, it may perhaps seem supererogatory to say, concerning structure, that it should be substantial as well as sightly. With the experience that has been acquired it will be simply disgraceful and inexcusable if another instance occurs of part of a new Board School tumbling during the process of building, from faulty construction, bad materials, or scamped work, one or other, or all three combined. The floor area, recently reduced by the Government Education Department, and the cubic space per child, must, of course, be provided, and do not call for comment.

Referring to errors and defects in some of the schools first built, a word or two may be offered. Each new Board school building is provided for the accommodation of three sets of schools; (1) for "babies" of both sexes, of from three to five years of age; on attaining to five years, they are classed as "infants," which they continue to be until they are seven years of age, when they become "boys," and "girls"; (2) a girls' school; and (3) a boys' school. There is a mistress over the infants' and babies' school, and another over the girls' school, and a master over the boys' school. They have each assistants and pupil-teachers proportionate to the number of scholars under their respective charges. The babies' department is a day-*crèche*, rather than a school proper, and the babies are accommodated in one room. In almost all instances there are one, two, and sometimes as many as four classrooms attached to the infants', girls', and boys' schools. It has been found excessively inconvenient in some of the schools first built that the scholars in the classrooms cannot be taken out, as need may require, otherwise than by being marched from the classrooms along the whole length of the principal school-room, which has, as may be supposed, a very disturbing effect upon the scholars in such room. Means of ingress and egress to and from the classrooms, without passing through the principal school-room, is, it must be seen, an important desideratum.

There are other serious defects in some of the earlier buildings. All of them, in so far as we have seen, make ample provision in playgrounds, w.c.'s, and lavatories, for the different classes of children, but (incredible though the almost indecent omission may seem) there are some of these schools in which no such provision is made

for mistresses, assistant-mistresses, and female pupil-teachers. In one school that we know of, they may use the same closet, if necessity compel, in common with the master and assistant-masters, the caretaker, and his family! They (the mistresses, &c.) have no private retiring place whatsoever. Mistakes in methods of warming schools have also been made that have necessitated the intolerable inconvenience of employing masons and iron workers in the rooms for months after the schools have been in full operation.

A set of new schools that have just been opened in Cottage-row, Bermondsey, are free from the faults and defects indicated, and others that might be named. They have peculiarities in situation, arrangement and design, that entitle them to something more than a mere paragraph notice. They are from the designs of Mr. M. C. Manning, architect, of Mitre-court, Temple; Mr. R. Mann, of Kentish-town, has executed the contract; Mr. G. C. Davies, to whom we are indebted for his courteous attention in answering inquiries, has superintended the erection of the buildings as clerk of works.

The schools are built on a large area, that was at one time a ship-builder's yard; ranges of lofty warehouses interpose between the schools and the Thames. The floor of the basement is about ten feet below high-water at spring-tides, which necessitated particular care and special provisions in the drainage. The drains from the school premises are all trapped twice before they discharge into the sewers. They are fitted with Clarke's patent valves, that effectually resist the entrance of tidal backwater. The treacherous nature of the "made ground" upon which the schools are built imposed considerable difficulties in obtaining a satisfactory foundation, some portions of which are 14ft. below the ground-level. The principal elevation has four gables, two of which, nearest the ends, are wider and loftier than the other, and are relieved with some very good "herring-bone" and chequered brickwork, with cinque-foil lights in the pediments, and open slits above them that give egress to the vitiated air from the air-chambers that are provided in the whole of the ranges of roof throughout. The style of the building is thirteenth-century Gothic. There is little or no pretension to ornament, which would be out of place in such a locality. The frontage bricks are red Essex, the inner work being of ordinary stock brick. The windows, gables, and corners have dressings of Bath stone. A dentilled cornice is carried along the wall-heads. The two bays that have the principal gables with the wider and higher pediments project considerably from the line of the main building and give relief to the elevation. The roof is covered with Delabole slates, and finished with Cooper's red tile ridges. The building has on all sides, particularly from the playground at the back, where the best point of sight can be obtained, a commanding appearance. The materials and workmanship throughout are of the best character.

The schools have a fore-court to the street, which is inclosed with a neat and strong iron railing on a curb of Yorkshire stone. At the back there are spacious asphalted playgrounds, amply furnished with w.c.'s and lavatories; the one inclosure is for boys, the other for girls, infants, and babies. The internal arrangements appear to be admirably contrived, and include several distinct and peculiar features that are worth notice. The basement is appropriated to the boiler and apparatus for the generation of heated air, by which the whole of the rooms are warmed on the system of Messrs. Price and Co., of the Adelphi. This system is in successful operation at Windsor Castle, St. George's Hall, Liverpool, and in numerous other public and private buildings. The warming is by air-chambers, and flues communicating with each room. The heated air is admitted, or kept out, at pleasure by valves moved by hand. It may be mentioned that there are only two fireplaces in the whole range of building. An open fire, accessible to the teachers, in case they might wish to make a cup of tea or coffee on a wet day, would probably have been a useful convenience. The basement has also spacious chambers for the storage of coal, and accommodates the gas and water-meters. Provision is made for emptying the water-pipes in case of frost. The gas is also fitted that it may be turned off at will on any floor, with the supply left for the others. All the gas pendants in the schoolrooms are hung with ball and socket-joints—the safest kind of fittings for school



purposes that can be adopted. Under the ground-floor there is a water-tank containing 1,000 gallons, from which by a force-pump, two galvanised cisterns at the top of the building, each containing 250 gallons, are replenished; these cisterns supply the lavatories, closets, &c.

On the ground-floor at each end of the range of buildings there is a separate set of infants' and babies' schools, which communicate with each other by a covered way which forms, besides, an architectural feature in the principal elevation. It has openings to the front with pointed arches. The two sets of rooms are about the same in dimensions. The two infants' schoolrooms are each 50ft. by 22ft.; the classrooms 20ft. by 14ft. 6in.; and the babies' rooms each about 19ft. 4in. square. These rooms are paved with zigzag wooden blocks, end-wood up, laid upon blue-lias concrete—a description of floor that gives promise of being comfortable and durable. In the central portion of the ground-floor there is a teachers' room 22ft. by 14ft. 7in. This room has a very quaint-looking Gothic chimney-piece. It is marked on the plan as a committee-room, and will be used by the local managers and deputations from the Board. On each side of this room are lavatories and cloak-rooms for the master and the two mistresses, who have each their separate entrances, and keys for admitting them to the school premises, and to the private accommodation provided for them. These rooms are furnished with Stider's patent tip-up basins. In another school at Kender-street, Hatcham, with which Mr. Manning was also connected as architect, we noticed an excellent arrangement in placing the retiring-rooms of the master and mistresses in such positions as to enable them to command the playgrounds of their respective scholars.

The first floor of the building is the girls' school, 61ft. 4in. by 21ft. 6in. At each end is a pair of classrooms, each of the four 20ft. square. The pairs of classrooms communicate with each other, and one of them has a door communicating with the schoolroom, its upper portion filled with polished glass. The other classroom communicates with the outer lobby and staircase, and is glazed in its upper portion with rough sheet glass. These doors are so arranged that the classrooms may be filled or emptied without the scholars passing through the principal schoolroom. This room is 14ft. 4in. high. The upper floor rests for its main support upon rolled iron girders laid upon stone templets flush with the wall. At each end of the girls' school floor there are water-closets for the use of the female pupil-teachers, a humane and most necessary provision, if either their health, comfort, or sense of delicacy are of any account. The relative positions of the boys' and girls' schools seem to be a decided improvement upon the prevalent arrangement of giving the boys the first floor, and sending the girls up to the second. The boys' schools on the second-floor, and the four classrooms attached, are the same in dimensions and relative positions and arrangements as the girls' rooms on the first-floor. The roof, of open timber, plastered between the rafters, has a small portion inclosed at the crown for the ventilating chamber, that is opened or closed by hatches working on pulleys. All the windows throughout have panes at the bottom and top hinged for ventilation. They are also fitted with linen sunblinds, with patent-roller mounting. The open timber roofs are lofty and highly effective. The rafters are 15in. between centres, and have sleeper pieces at the feet, as the style requires. The school and classrooms have dados of Portland cement, with Portland stone copes. These, about 3ft. from the floor, might, we think, have been deeper with advantage. The walls are whitewashed, without plaster.

The staircases, and lavatories and cloakrooms for the scholars, are special features in these schools. There are two double staircases for boys and girls. Each pair occupies one well, the flights crossing each other at the centre, but the two stairs as completely cut off from each other as they would be if in different parts of the building. We believe these were the first Board Schools designed on this principle, if date of the plans is to be taken as evidence of priority. The double-stairs play an important part in the economy and management of the schools, especially in relation to the mode of filling and clearing the classrooms before referred to. The boys have a covered way at the back of the main building that communicates between the outer entrance and one of the pairs of classrooms.

The lavatories and cloakrooms are on a

mezzanine floor, and are so contrived as the scholars who are arranged in the playgrounds can be marched through in single-file, and hang up cap or cloak as they pass their respective numbered hooks, and enter the schools or classrooms ready for work. A necessary condition of this excellent mode of handling the scholars should have been coverings for portions of the playgrounds. The cloakrooms have cross screens with a clear passage between and round the ends of each. The files of scholars pass between the screens and round alternate ends. The rooms have rows of washing basins of cast-iron enamelled, with simple and effective fittings for filling and emptying. In some schools the children's cloaks are flung together into baskets, and after a heavy summer shower, literally ferment, and cause a most offensive nuisance. In the cloakrooms under review, provision is made for sending a strong stream of fresh air across the rooms. The girls, infants, and babies have two entrances from Cottage-row; the boys have two entrances, quite apart from these, from Wells-street and James's-place. The caretaker's house, partly detached, has adequate and convenient accommodation in four rooms.

The schools have cost about £9,000, and were originally designed for the accommodation of 280 boys, 280 girls, and 440 infants and babies, or 1,000 in all. Under the new regulations, they will accommodate about 1,200. In fine, the London School Board may be congratulated upon having acquired, and Mr. Manning on having produced, in the Cottage-row Schools, a pile of building sightly, substantial, well-lighted, thoroughly ventilated, well-planned, and in all respects admirably adapted to its intended uses.

#### ON SCHOOL BUILDINGS AND FITTINGS.\*

THIS very wide subject is one which it is impossible to embrace fully within the narrow limits of a single paper, and I have judged that the most useful course will be to consider the buildings and fittings of public elementary schools, such as are now required in every part of England, and public middle-class schools, the call for which is beginning, and only beginning, to make itself felt, and I shall not attempt to pursue the many ramifications into which the subject might extend. If we commence where elementary education itself begins, namely, with the infant-school, we shall find the circumstances for which the architect has to make provision to be very much as follows:—A considerable number of little children, many of them quite unused to any discipline, and all restless and childish, are to be trained, reduced to order, instructed, and prepared for entering a higher school, and for this arduous work the services of one or two teachers, and one or two young assistants, are obtainable. Little personal attention can be given during school hours to an individual child, for if the teacher's eye is taken away from the group discipline relaxes; but as a compensation for this the influence which the teacher can exert over the children in a mass is extraordinary, and produces the most salutary effect upon each component of that mass. It is accordingly necessary, as much as possible, to keep the children grouped under the teacher's eye. In addition to a provision for this purpose, space in which exercises more resembling drill than anything else can be carried on is essential, for the restlessness natural to a very young child cannot be long controlled, and frequent change of occupation and position is necessary, and should be so provided and regulated as to form part of his training. We must, in order to meet these requirements, provide a large room, with plenty of unoccupied space in which our infants can march about, and we must provide a sloping group of seats on which they can sit clustered together and directly under the eye of their teacher. It is particularly essential that the room should be sweet, sunny, and cheerful, and to obtain these ends we should give it a considerable height, introduce ample windows, obtain a sunny aspect for it, and give it a little simple decoration. Lastly, it is desirable that when the children look at the teacher and she at them, her face and their faces should be well and naturally lighted, with nothing to dazzle either. To accomplish this we must provide if possible a

skylight over the raised seats, or as they are usually, but somewhat unsuitably called, the "gallery." The programme upon which a good infants' school-room can be built, and one which is not now often departed from widely, is therefore ample clear space—raised top-lighted gallery—and plenty of light, ventilation, and sunshine. Among the infants there will be considerable variations; some of the younger will be brought who are too childish for it to be possible for them to be interested in the lessons which the generality can follow, and these, if not weeded out, will destroy discipline; others, among the elder, will have acquired, before passing into the higher schools, some power of application and some knowledge of writing and even ciphering. The very little ones are best drafted off into a room by themselves, where they can be kept amused; this room is called the babies' room. For the most advanced, desks and benches must be provided in the school-room, at which they can write, with sometimes a smaller separate gallery on which they can have a collective lesson; but where the school is at all large there will be enough children answering to this description to render desirable the provision of a second classroom for them, in which they can be partly removed from the noise and movement of the general room. It is always desirable for infant-schools to be on the ground-floor, as the steps up to a schoolroom on an upper floor, which are no very serious evils in the case of some advanced children, are dangerous and difficult for infants. A width of 24ft. to 25ft. is desirable for the general school-room, and the Education Department requires the area of school and classrooms together to reach 8ft. of floor for each infant. It is not considered that more than 250 infants can be as a rule managed with success under one head teacher of ordinary capacity, and if the requirements of the district call for a larger amount of accommodation, it will be better to build two infant-schools.

It is also considered that 70 is as large a number as one teacher can usefully instruct at one time, and therefore the largest gallery in an infant-school had better not seat more children. In very large infant-schools two such galleries may be placed side by side, with a sliding partition to separate them. The fittings of an infant-school are simple, and must be adapted to the size of the children. The gallery, the one fitting peculiar to infant-schools, is a platform broken into broad steps of no great height. In some schools the infants sit on these steps, but it is far better to provide little seats, furnished with backs, the seatboards fixed a trifle above the step. Gangways of shallow steps are formed at each side, and the sides are inclosed. It is not well for infants to sit more than six deep on a gallery, and generally five deep is enough. It is advantageous to be able to place the gallery partly in a recess, so as to leave the schoolroom floor less interfered with, and also so as to obtain a sky-light. Such benches and desks as are used in the room may correspond (except in height) with those required for higher grades, but I think desks with flaps ought not to be used. Most infant-teachers prefer desks with a flat top, as kinder-garten toys can be placed on them without their rolling off, and I have seen them used with a slate top. A good covered playground is almost essential for infant children; and it is very customary, and very advantageous, for the playground to have a few simple pieces of gymnastic apparatus, such as parallel bars, &c. It is, I believe, not found advisable in practice to make the girls and the infants share the same playground. When public attention was first turned to the education of the multitude in this country, the sort of training in the mass which I have sketched out as suitable for infant children was applied to those of more advanced years. This was the famous system of Bell and Lancaster. It was in 1798 that Lancaster opened his first school, and the type of building which this method required was as widely different from that which we have arrived at after three-quarters of a century of modifications as can well be conceived, so that those who, like myself, consider that a perfect model has not yet been attained, may very well hope to see further modification take place. A Lancastrian school-house was, generally, nearly square, lofty, and airy, and fairly lighted, but most forbidding and grim in aspect. The scholars, who were partly looked after by monitors, sat so as to form a compact square phalanx under the head-teacher's eye, and very large numbers were taught in one school under such a system; indeed, Lancaster is reported to have said that he should

\* From a paper read by Mr. T. ROGER SMITH, F.R.I.B.A., before the Society of Arts, on Wednesday, Nov. 24, 1874.



not shrink from conducting a school of 1,000 scholars in one room. The instruction given by the chief teacher under such a system as this must necessarily have been simultaneous, and no large amount of attention can possibly have been given to individual pupils. From this original starting-point a series of modifications has been introduced into the methods of teaching, all tending to secure more separation of classes, and more possibility of aiding individual scholars in their work. In 1834 grants of public money began to be made towards school-houses, and in 1839 the Committee of Council began to administer these grants. In 1840 instructions and plans of schools were first published by the Committee as a guide to those proposing to build, and the type of building which they embody, and which has been repeated hundreds and thousands of times since, is adapted to a system far removed from that of Lancaster. The pupil-teacher had now taken the place of Lancaster's monitors. Assistant teachers were also introduced. Teachers were now sufficiently numerous in proportion to the number of children to render it possible to break up the school into distinct classes, each one under an assistant teacher or pupil-teacher. It was desirable to separate the classes one from another, and yet not to remove them from under the teacher's eye. When this system was first worked out in British schools, these classes were planted about in different parts of a large room, an arrangement to this day adhered to in many places. But the isolation to be obtained in this way is very incomplete; there is no mitigation of the noise of teaching, and no means exist of preventing the children's attention from being constantly diverted from their work. The Committee of Council introduced an arrangement which very much diminished these evils. They recommended that classes should be arranged along one side of the room only, and fixed—partly, I believe, from motives not directly connected with school discipline—16 feet as a minimum and 20 feet as a maximum width for the schoolrooms, and they prescribed that the children should, when in class, sit no more than three deep. This, of course, led to very long narrow rooms, which were often shaped like an **L** or a **T** on plan. Curtains were generally provided for the spaces separating the classes, but from the angle of the **L** or **T** the head teacher could pretty well see all the classes. Of the width of these narrow rooms less than half is ordinarily occupied by the three benches and their desks, so that there is ample space for the teacher to draw out a class from their seats and make them stand round him. Such schoolrooms generally have windows on both sides, admitting of good ventilation, but often giving cross lights; they are carefully arranged so that no fire-place or door shall interfere with the unbroken continuity of the wall against which the classes are planted. One or two classrooms were thought ample for a large school of this sort; and the whole arrangement, though open of course to objections, has many points of practical excellence to recommend it. It is appropriate to the system of teaching; it admits, generally speaking, of being economically carried out, and yet may be made picturesque; but its chief merit was that it was the plan, and I believe it is correct to add, the only plan towards carrying out which the Committee of Council would sanction money payments so long as these payments were under its control. The passing of the Elementary Education Act has opened the door for fresh modifications to be introduced, and it will be useful to describe what has come under my own immediate notice in the plans introduced by the School Board for London, and which are the results of thoughtful and practical consideration of the problem by many persons of varied and great experience. These plans, in several essential particulars, depart from the original programme of the Committee of Council, and the changes introduced into them constitute an immense step in advance. In crowded neighbourhoods, where land is very dear, accommodation for large numbers had to be provided; it consequently seemed essential to have high buildings. Schools of two and three stories, with in some cases covered playgrounds, were accordingly decided upon. The stereotyped arrangement of desks three deep had not been strictly adhered to by all teachers. Many found it quite practicable to teach children four deep and even five deep without disadvantage. It was accordingly decided from the first to abandon it, to build wider school-rooms, usually 22 feet wide, and to arrange the children in deeper rows.

children was revised, and fittings by which their desks and seats are arranged in pairs, so that every boy or girl can be readily reached by the teacher, were adopted. More radical, however, were the changes desired to be brought about in the accommodation of the classes, and in the lighting of the children's seats. In most of the Board-schools half the number of children are taught in the schoolroom and half in classrooms. The Revised Code provides for six grades of proficiency in children, and this has led to the idea that six classes should as a rule be provided for in planning a school. In practice, there are more children of the lower grades than of the higher in every school, but those in the higher grades are larger children, and require more space, so that a common custom has been to provide in a department (that is to say in a boys' or girls' school) three classrooms and a schoolroom capable of seating three other classes. In many cases two classes are placed side by side in what is called a double classroom, which can be divided into two by closing a moveable partition. It by no means follows that these arrangements are uniform. Sometimes there are four classrooms; sometimes the classrooms are built for rather larger classes than those in the schoolroom, and sometimes the opposite is the case, but the proportion has been generally pretty well observed. The classrooms at first were required all to open direct out of the schoolroom. It is now considered desirable—which it was not at first—to have the power of assembling or dismissing a class working in a classroom without its being essential to pass the children through the schoolroom. The classrooms are generally 20ft. from front to back; this gives, if 10ft. of floor is provided for each child, 20ft. as the width of a classroom for 40, and a room 20ft. by 20 can be very conveniently seated for 40 with dual desks; 9ft. is I think the minimum area per child in a schoolroom or classroom. The classrooms are ordinarily provided with windows on at least two sides, and the schoolroom with windows back and front, and, where possible, at the ends. These afford good means of getting through ventilation, and a fair amount of left-hand lighting; in fact, two of the three classes in classrooms, and one class of the three in schoolroom, can obtain a good left-hand light. The advantage of side-light over light from behind the children is that the teacher is not dazzled, and the children's faces are not lost to the teacher, and the children do not sit in their own light. The advantage side-light possesses over light from behind the teacher is that the children are not dazzled, and that their teacher and his diagrams are easily seen. The rule of lighting from the left cannot be completely carried out, except when the teaching is in classrooms, for if, in a schoolroom where several classes are taught, you attempted to place the children with their seats at right angles to the wall, you would be landed in a series of inconveniences so grave that they could not be tolerated. Nor can the rule of lighting only from one side be easily reconciled to that passion for thorough ventilation by means of a direct current of wind from window to window which has so strong a hold upon those experienced in school management as well as hospital management in England. Accordingly, the practice with regard to schoolrooms has been at the best a compromise. As much side-light as is obtainable has been in some of the recent London schools procured from the ends of the general schoolroom, but for the majority of the classes there taught, windows both back and front are commonly supplied. In Prussia, where school management has been deeply studied and carefully thought out, it has long been a cardinal rule that every class occupies a separate classroom, and that every scholar in the class shall receive the light from his left-hand. What has been done in the London schools is an approach towards applying these two rules, but falls short of perfect conformity to them. It is not, however, easy, so long as the pupil-teacher system prevails, to conduct the whole teaching in classrooms, but if the conditions are manifestly better than those obtainable in a school as at present conducted, it seems clear that a strenuous effort ought to be made to secure the advantage of the classroom system; and if it and the pupil-teacher system seem to clash, that such modifications should be made in the latter as will suffice to reconcile the two. The difficulty arises from the fact that a teacher, shut up in a room with forty, fifty, or sixty children to manage, requires to be a person of much more experience and

judgment than an ordinary apprentice, and that therefore a school made up of classrooms seems to call for a series of highly-paid assistant teachers; and I venture, however, to think that by working the classrooms in pairs, two together, a close approach to the perfect classroom system may be made without giving up pupil-teachers. There can be no doubt that the power of dividing a large classroom into two by means of a sliding partition is a valuable one, and that it is perhaps desirable to put up with some drawbacks of another sort for the sake of securing this advantage, but it is fair to point out that drawbacks exist. There is less perfect separation of the rooms by means of a sliding partition than when they have a wall between them. No sliding partition is entirely free from danger to the children, and the opening and shutting it is a disturbance of tranquility. The older sliding partitions were constructed to rise and fall in grooves like a sash-window—the modern ones are usually made to roll horizontally, being usually hung from a rail above, and also allowed to rest on the floor below. Though sometimes a roller-blind has been suggested for the purpose, it cannot prove efficiently sound-proof. I have employed Mr. Stones' partition, which contains felt enclosed between two thicknesses of boarding, and found it fairly sound-proof, but I do not believe it to be possible thoroughly to isolate a classroom by means of any sliding partition. The London Board-schools have not been mixed schools except in the case of infants' schools, and each department for boys or girls has had a floor to itself. Consequently there are at least two floors, one above the other, in every "graded" school; indeed, the buildings are commonly three stories high, and therefore the necessity for staircases. The staircase most suited for children's use is one where the open space with which we are familiar by the name of well-hole is replaced by a brick wall. The steps ought not to be too long, as it is rather desirable not to induce children to go up or down more than two abreast. I believe a length of 4ft. 6in. to be ample, and 4ft. or even 3ft. 6in. enough. The steps should not be high, not more than 6in. rise. There ought not to be any "winders," and in their place there should be landings; lastly, the flights of steps should be short, and the whole ought to receive plenty of light and air. In a school of any size it is not only desirable to have two staircases, one for boys and one for girls, but it is an excellent plan to arrange the steps so that two sets of stairs may occupy the space of each staircase. When this is done each classroom may open into the landing of a staircase if wished. The tall buildings which require such staircases are no doubt proper in a large city, where land is very dear, and where daylight is apt to be much interrupted near the ground, but where there is sufficient space, free air, and ample light, one storied buildings are best. The covered playground, when formed under a lofty building by carrying it on piers and arches, is often less desirable and comfortable than a shed built for the purpose. It is more apt to be drafty and gloomy, and damp, and when it is adopted it should be arranged so that the sun may shine well into it for some considerable part of the day. How to warm, light, and ventilate a large schoolhouse, is the next question. The lighting should be as far as possible from the left hand, and the windows should be ample. An area of 1ft. of window surface to 80 cubic feet of interior space in the room ought to be sufficient, if the windows are well placed. For infant-schools a top light, and for drawing-classes a north light high up, are required. The best aspect for a school is a subject that has been debated, some advocating a north aspect as securing the steadiest, purest light, and being free from the inconvenience of glare, others preferring a south aspect, notwithstanding the fact that occasionally during the summer blinds are needed, and inconvenience is felt from the sun's direct rays. There can be little question that the last is the soundest opinion, that sunshiny rooms are far more healthy and far more pleasant than those which the sun never reaches, and that, in our climate this consideration ought to prevail over every other. The question of gas-lighting does not call for any very special remark; good burners, plain strong fittings, and a place for the lights which will bring them tolerably near the children, are the chief requisites. The question of heating is, to a certain extent, mixed up with artificial ventilation, and both ought to be looked at to—

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## ILLUSTRATIONS.

THE ARTHUR CRAWFORD MARKET, BOMBAY  
—MARKET FOUNTAIN, BOMBAY—FRENCH,  
ITALIAN, AND ENGLISH SCULPTURES, NINETEENTH CENTURY—WOOD PORCHES—NEW  
OFFICES FOR THE LANCASTER GAS CO.

## OUR LITHOGRAPHIC ILLUSTRATIONS.

## WOOD PORCHES.

THE accompanying details and sketches, by Mr. W. H. Lockwood, of the Adelphi, were prepared for entrance-porches to cottage buildings.

## FRENCH, ITALIAN, AND ENGLISH SCULPTURES.

Our double-page this week illustrates several modern specimens of sculpture commented on by Dr. Zerffi on p. 628. This plate finishes the interesting series of sculpture illustrations.

## THE NEW OFFICES FOR THE LANCASTER GAS COMPANY.

Which are now about completed, stand on a plot of ground adjoining the Town-hall, and facing towards the market-place. On the ground-floor is a general office, private office, lavatory, and workshop; on first floor a large showroom for exhibiting gas-fittings, also storeroom, &c.; and on second floor storerooms. Local freestone has been used throughout. The shafts to entrance, &c., are of Shapred granite. The contractors are—for the masonry, Mr. C. Baynes; joiners' work, Mr. C. Blades; slating and plastering, Messrs. Cross and Sons; plumbing, &c., Messrs. Willan and Clemenson; cabinet-makers' work in office fittings, by Messrs. Haworth and Whittaker; the architect being Mr. Rowland Charnley, King-street, Lancaster.

## NEW MARKET AND FOUNTAIN AT BOMBAY.

The new market and fountain at Bombay, which we illustrate, are from designs by Mr. W. Emerson, architect. We have no further particulars to give respecting them.

## THE PROPOSED METROPOLITAN CENTRAL MARKETS.

NOTICE has been given by the Corporation of London of application to Parliament next session for power to establish a new Fruit, Vegetable, and Flower Market at Smithfield.

The Corporation intend to enlarge the Western Extension of the Metropolitan Meat and Poultry Market by extending it at its southern and western sides, appropriate the site or a part of the site adjoining, and to the westward of the said Extension Market, and the land situate between Snow-hill and Farringdon-road to be acquired under the powers of the Bill, for the purpose of establishing thereon the new Market.

It is proposed to widen King-street on its northern side, to make a new street from King-street from a point a little to the west of St. John's-court, and running on the side of the Western Extension of the Metropolitan Meat and Poultry Market into Charterhouse-street; and a new street from to or near where Snow-hill and Farringdon-road unite.

Upon the completion and opening of the new market Farringdon-market will be closed, and the site sold or otherwise utilised, as the Corporation may think fit. The new markets are to be called the Central Markets.

The lands to be acquired are, and the works to be constructed will be, wholly situate in the parish of St. Sepulchre, in the City of London, and the parish of Saint Sepulchre, in the County of Middlesex, or in one of those parishes. Duplicate plans and sections, describing the line, situation, and levels of the proposed new streets or approaches, and the property in or through which they will be made, and duplicate plans showing the lands, houses, and other property which may be taken under the powers of the Bill, together with books of reference to such plans containing the names of the owners and occupiers, will on or before the 30th day of November instant be deposited for public inspection with the Clerk of the Peace for the City of London, at his office at the Sessions House, Old Bailey, and with the Clerk of the Peace for the County of Middlesex, at his office at the Sessions House, Clerkenwell-green, and also with the Parish Clerk of St. Sepulchre, at his residence, and with the Clerk of the Board of Works for the Holborn District, at his office, 20, High Holborn.

## BRESCIA.

THERE are fewer attractive buildings in Brescia (says the *Saturday Review*), whether ecclesiastical or domestic, than in most Italian cities. The most striking is the *duomo vecchio*, the old cathedral, the famous round church of Brescia. The new cathedral by its side is a building of no importance; but it is, at least, to the credit of its builders that they left the old one standing. Had the same discretion been shown in some other places, we should have many more monuments of early times than we have. But if the round church has not been destroyed, a vast deal of labour has been spent on the characteristic work of spoiling it. The upper round, the clerestory, has not been seriously meddled with, and it still keeps the majesty of its circular outline, having a far greater effect of spreading massiveness—the proper effect of a round building—than any of the round churches of England. But the lower range has been sadly tampered with, and the inside has suffered from the process which the English translation of Bédaker calls "painting the pillars to resemble columns." The round rests on massive square piers, in German *pfeiler*, and the whole has been, like St. Vitale at Ravenna, bedaubed to imitate Renaissance architecture. This makes the general look of the inside sadly disappointing. But the disappointment begins to vanish as soon as we make our way underground and see the capacious crypt, with the endless variety of its columns and capitals of all manner of forms, some of them clearly Classical ones used up again. This crypt proves that the round church of Brescia had, as all our round English churches have at present, a choir projecting to the east, but the choir to which the crypt belonged has given way to a late building on a much larger scale. There is also in Brescia a Romanesque church of the Basilican plan; and within the range of the extensive buildings which now go by the common name of St. Julia—a suppressed monastery, now put to various uses, military and municipal—are three churches. One of these, Santa Maria in Solario, a square Romanesque building with an octagon top, shows itself in the street, but, unlike the usual rule of Brescia, the inside, except the crypt, hardly fulfils the promise of the outside. In truth a small building of this kind, where there can hardly be any columns, allows of but little scope for display within, unless, like the buildings of its class at Ravenna, it is covered with mosaics. Far more important than this is another of the same group, San Salvatore, attached at a lower level to the worthless church of St. Julia proper. Here, when we penetrate to it, we come to a genuine church of the Basilican type, which to some travellers may chance to be their first specimen of that type. Two ranges of columns above, and a crypt below, exhibit the usual features of buildings of this class—columns with capitals of various kinds, Classical and other, ranged as happened to be convenient. Every building of this kind has its interest, and to some it may happen to be the first foreshadowing of its more stately fellows at Ravenna, at Lucca, and at Rome. But the chief attraction of Brescia is hardly to be found in its churches. Had it been left uninjured, the great *Broletto*, in much the same style as the smaller one at Como, and like that, hard by the *Duomo*, though not actually touching it, would doubtless have claimed the first place. But the building is sadly disfigured; its blocked windows merely peep through to show what they were. On the whole, the first place among the antiquities of Brescia must be given to the Museum, formed out of an excavated temple. The remains of the building itself, the stately columns of its portico which still survive, are striking in themselves, and they supply one piece of detail which is interesting in the history of architectural forms. The columns do not form a continuous range, but the portico has projections in front. The angles have thus to be provided for, and they are provided for by forestalling, in the architecture of the days of Vespasian, the section of the Mediæval clustered pillar. Within, in the restored triple *cella*, is a whole store of anti-

quities, Classical and Mediæval. The gem of the collection in an artistic point of view is doubtless the figure of Victory, of Greek workmanship; but more light is thrown on Brescian history by the long series of inscriptions, ranging from the first Imperial days to Gratian and Theodosius, and by the other long series of architectural details, Classical and Romanesque, from the destroyed buildings of the city.

## SCHOOLS OF ART.

READING.—The thirteenth annual distribution of prizes to the students of the Reading School of Art took place on Thursday week. The report of the committee stated that the Art School had been continued satisfactorily during the past year, under the efficient management of Mr. Havell. The Science Classes still continued to suffer from the want of a permanent recognised building. The only real cause for regret was the comparatively small number of students. The number of pupils attending the Art School was 134. At the second-grade examination 64 students presented themselves, of whom 34 were successful, and 13 won prizes. In the third grade, 437 works were sent up to the annual exhibition in London by 76 pupils, 5 of whom were awarded Queen's prizes.

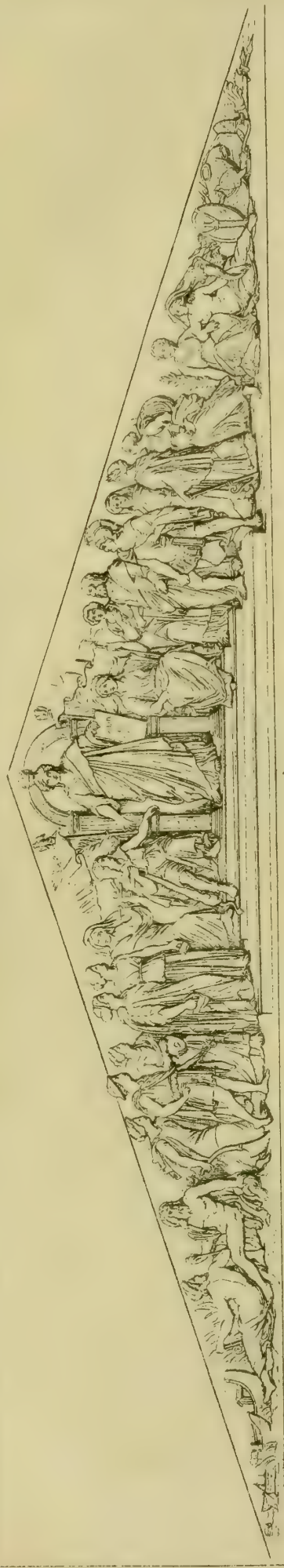
WALSALL SCIENCE AND ART INSTITUTE.—The annual meeting for the distribution of the prizes and certificates taken by the students connected with this Institute was held on Thursday week. The report was of a satisfactory character, except in one particular, viz., the secession of the art department, under the direction of Mr. Mulligan. At the last examinations there were about 40 students connected with the science department, and the entries for examination were in inorganic chemistry 9, carrying off 4 Queen's prizes and 4 certificates; in animal physiology 18, carrying off 3 Queen's prizes and 9 certificates; in physical geography 21, carrying off 7 Queen's prizes and 11 certificates; in mathematics (in which the questions were very severe) 10, carrying off 4 certificates; and in magnetism and electricity 16, carrying off 7 Queen's prizes and 1 certificate. In the different subjects in the art department 12 students were examined who took 3 Queen's prizes and 12 certificates. In the science department the committee had this year increased the number of subjects from 5 to 13, and the chairman had suggested the establishment of penny classes in mathematics and arithmetic. The number of students enrolled in this department was 96, as against 40 last year. In the art department there had been some difficulties, but they had been enabled to secure a most efficient teacher (Mr. C. Gregory), and they started with 40 pupils, others being added every week.

WINCHESTER.—The fourth annual meeting of the students and supporters of the Winchester School of Art was held on Wednesday week. According to the report, in the course of the year from September, 1873, to September, 1874, there had been 126 students, of whom 81 attended the day and 50 the evening-classes. For the 2nd grade examinations, which is held on the spot, in elementary drawing exercises to be done at a certain time, 19 students were successful in 21 papers, 6 being marked excellent. In the 3rd grade examination of the entire work of the school done during the year, 6 students were commended for elementary work, 10 for advanced work, 10 received third grade prizes, 2 received free studentships, and 11 had 19 works selected for national competition. The standard of general work has not only been maintained, but the results show a higher excellence on the average in the more advanced stages of study than has been reached before. Out of 7 3rd grade prizes awarded last year, only 4 were for advanced work, while this year 10 have been awarded, all for advanced work. Last year 4 works of 4 students were selected for the national competition, while this year 11 students have been distinguished with 19 works for competition, which embraces all the schools of art throughout the United Kingdom.

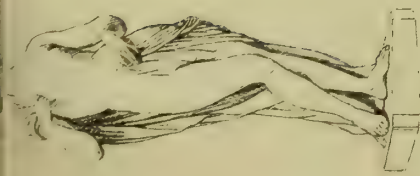












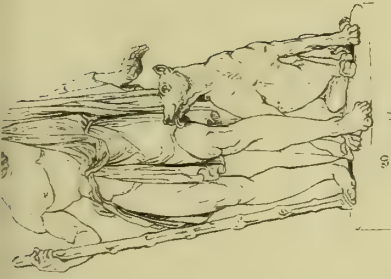
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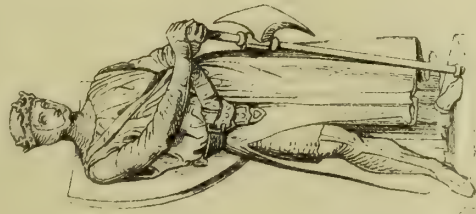
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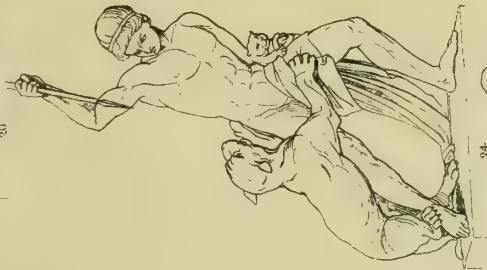
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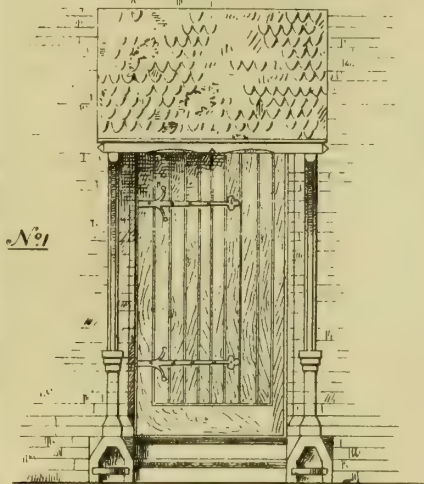






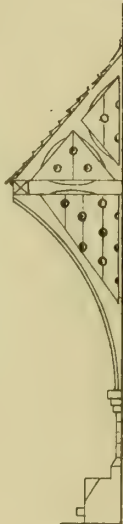
• PORCHES • [WOOD] •

By W. H. Lockwood.  
10 JOHN ST. N. Y.

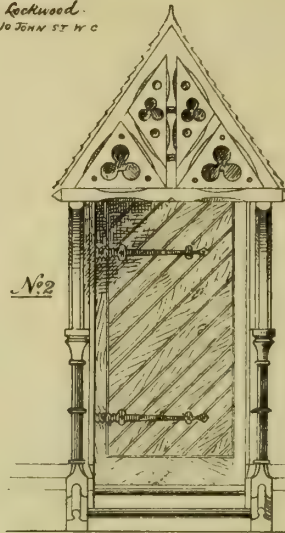


N<sup>o</sup> 1

ELEVATION



SIDE VIEW

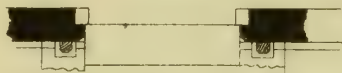


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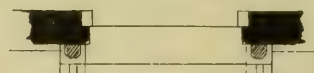
ELEVATION



SIDE VIEW

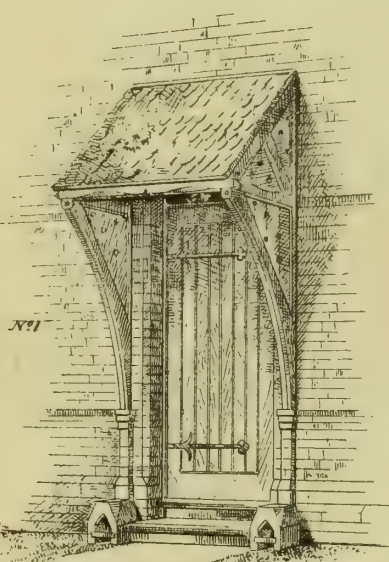


PLAN

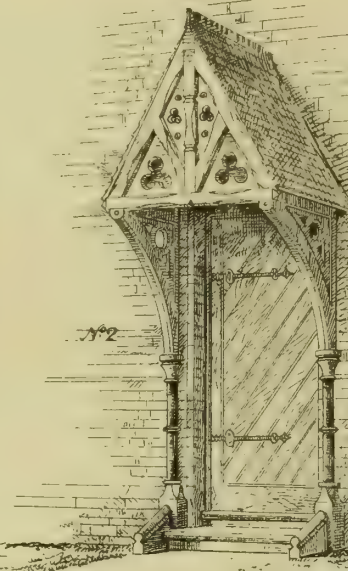


PLAN

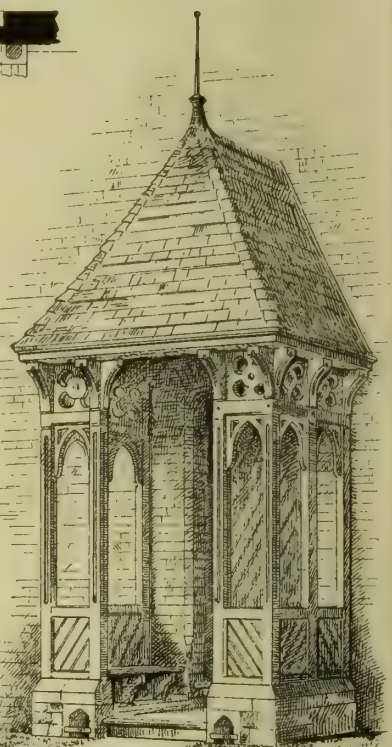
Scale of Feet.



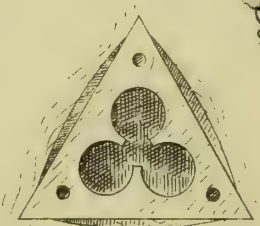
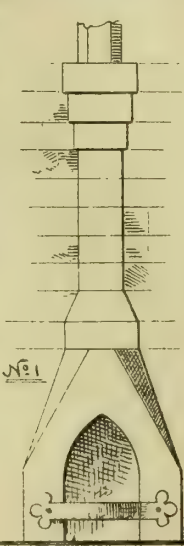
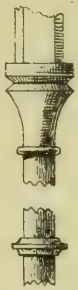
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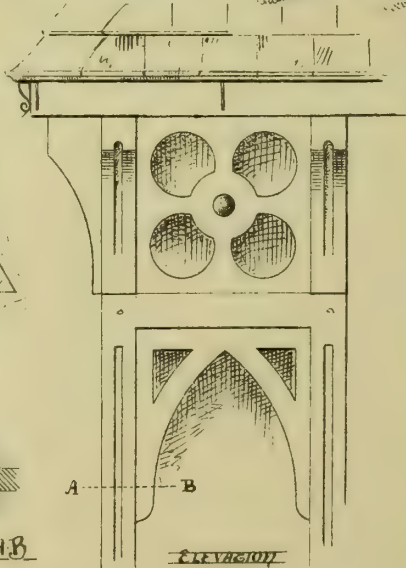
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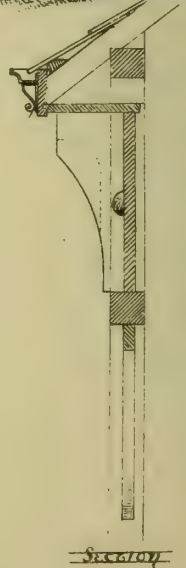
DETAILS



SECTION A B



ELEVATION



SECTION

Scale of Feet.

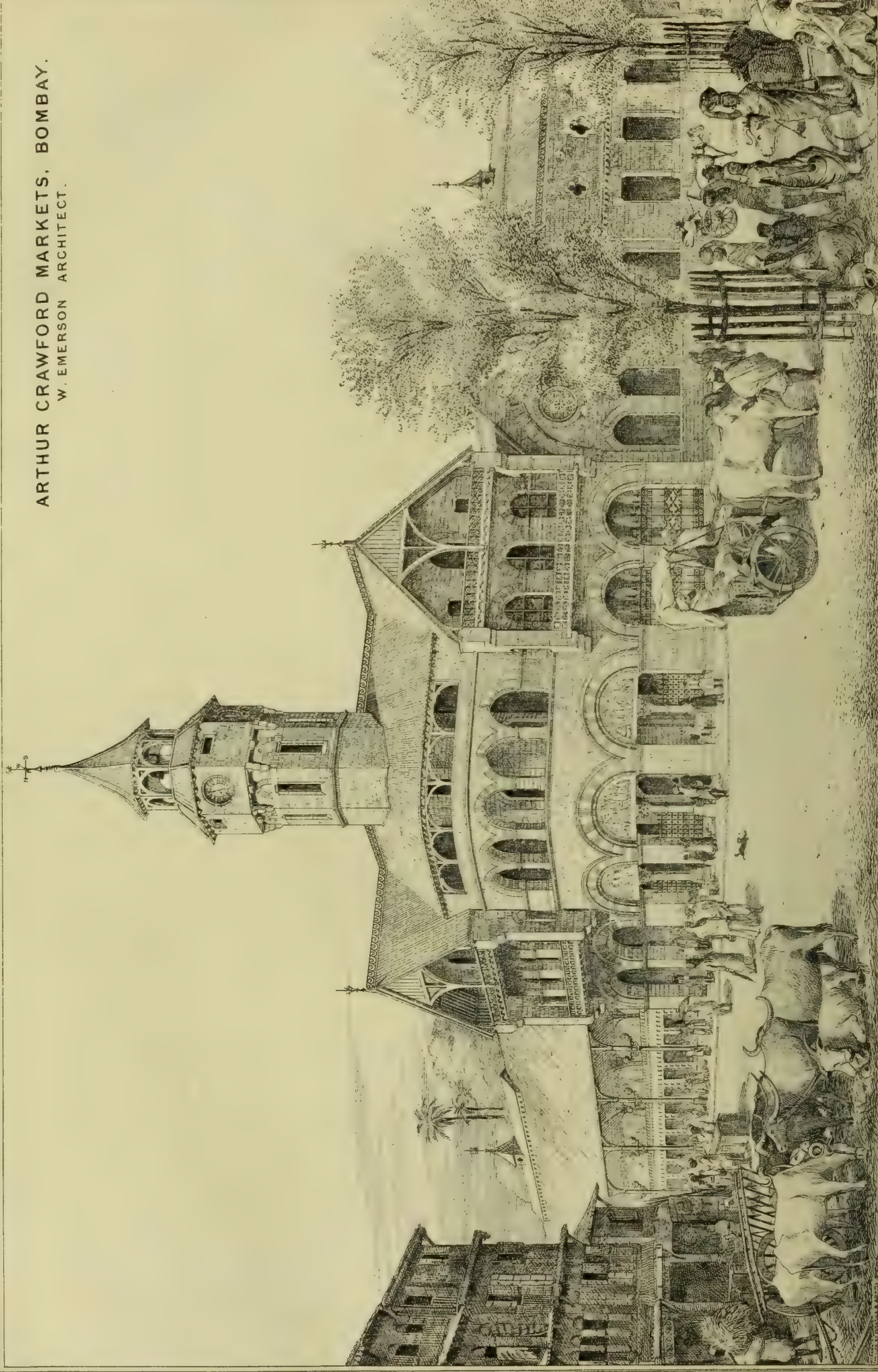




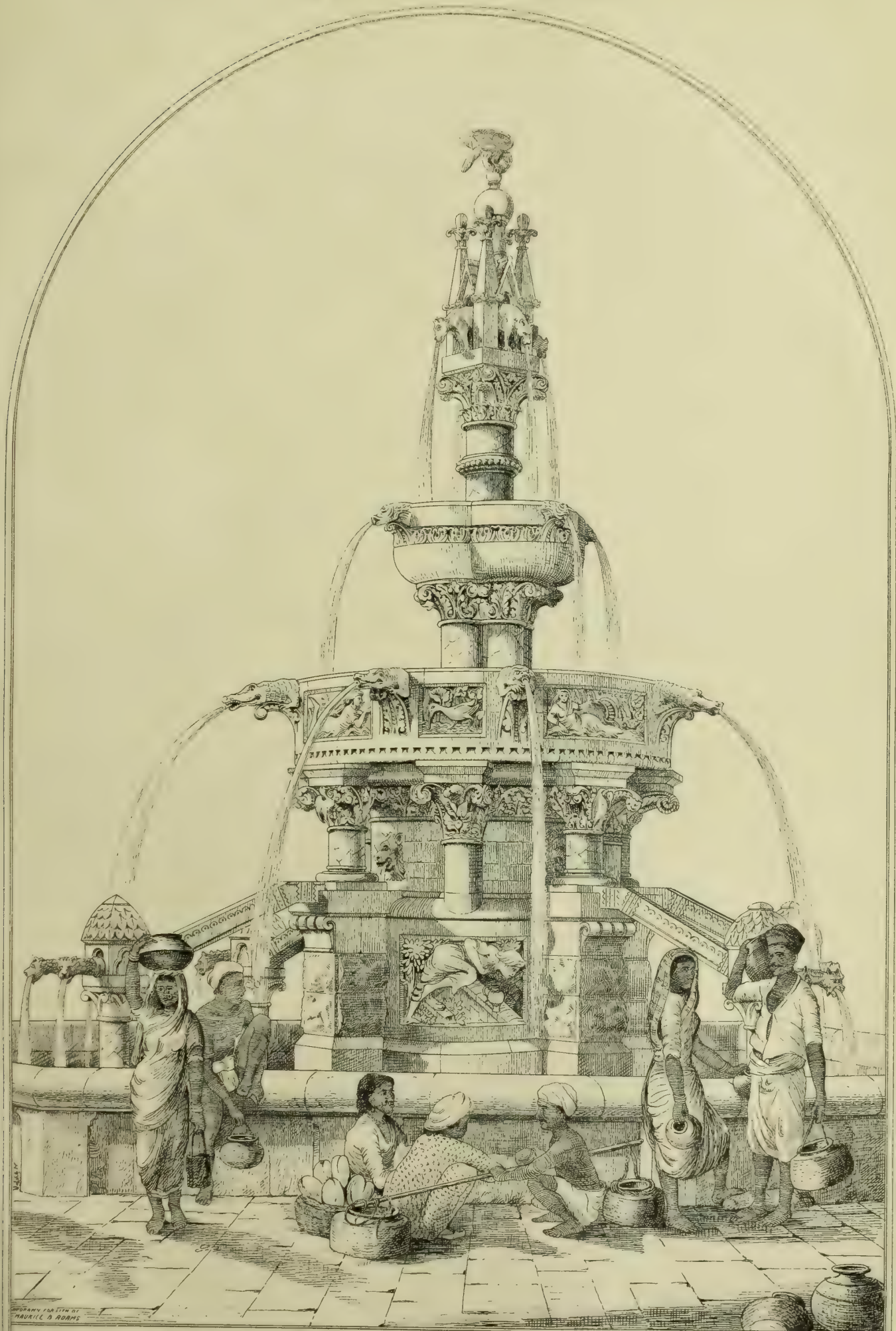


THE BUILDING NEWS, Nov. 27. 1874.

ARTHUR CRAWFORD MARKETS, BOMBAY.  
W. EMERSON ARCHITECT.



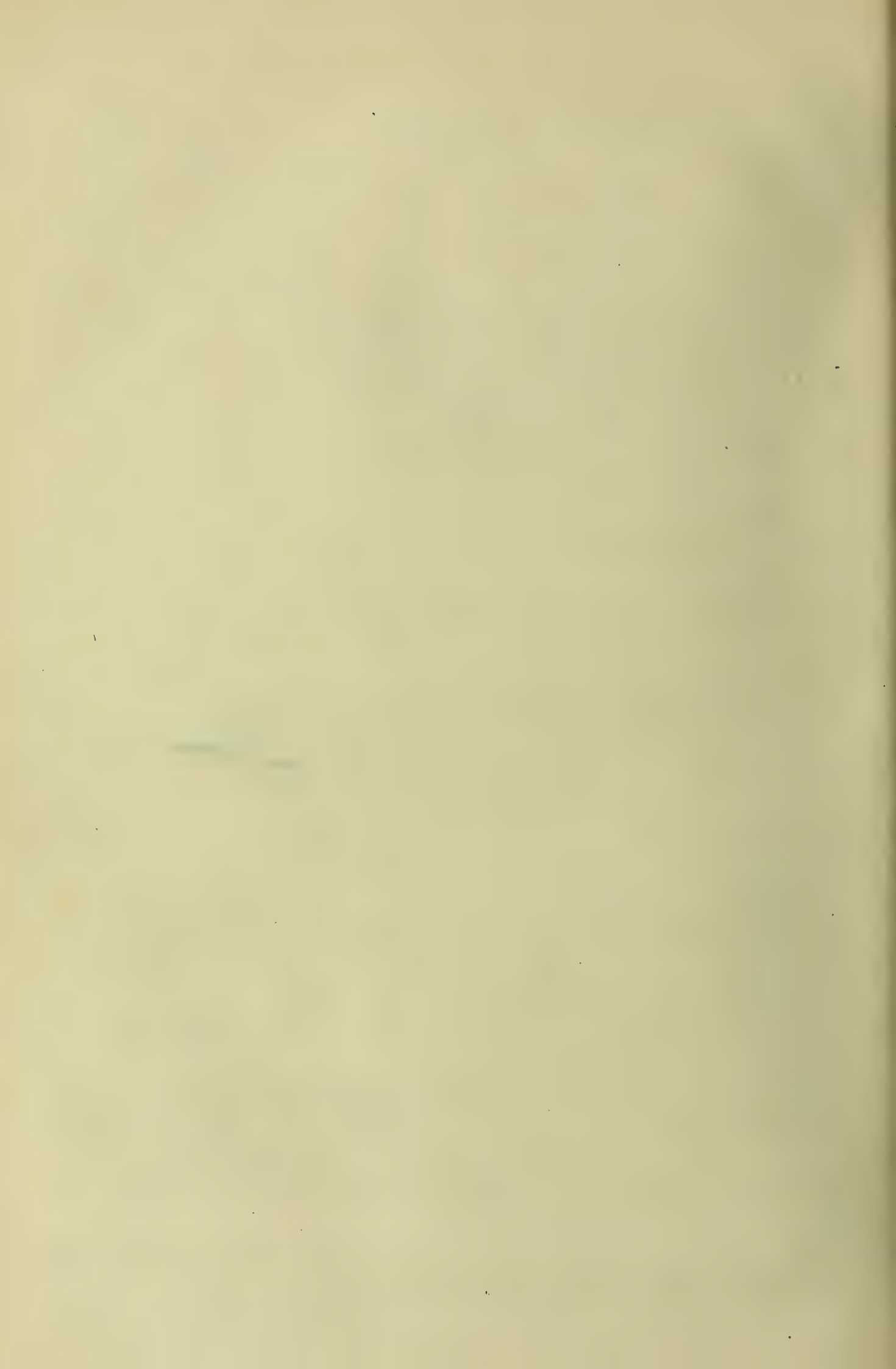




DESIGNED BY  
"HARVEY & ADAMS"

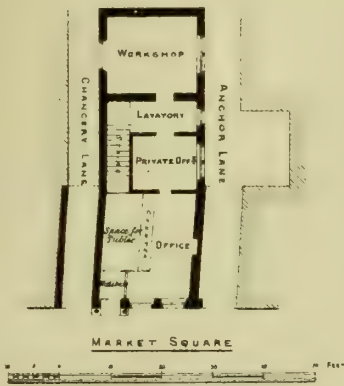
MARKET FOUNTAIN BOMBAY \* W. EMERSON ARCHT.







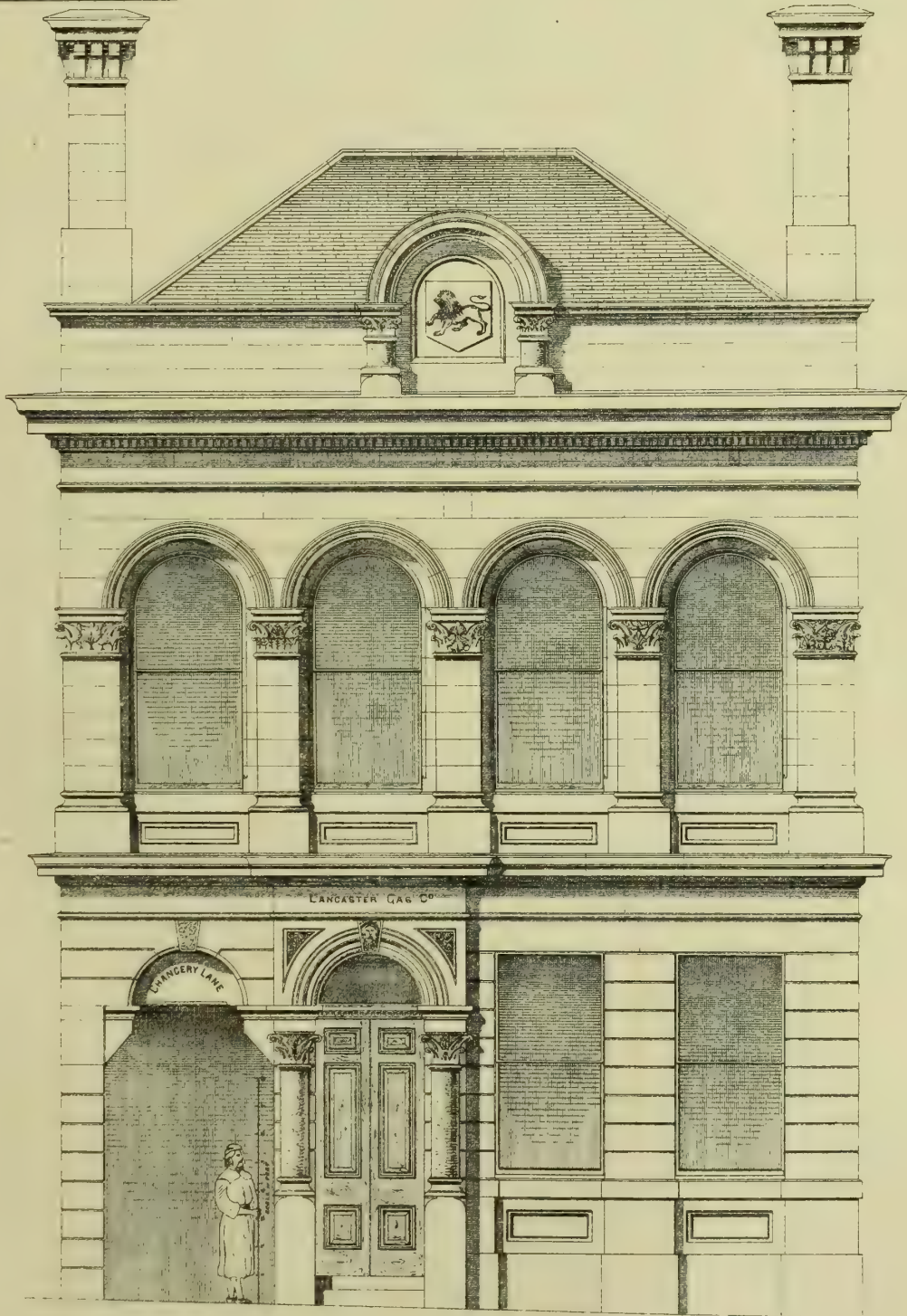
GROUND PLAN



# New Offices for the Lancaster Gas Co

R. CHARNLEY, ARCHITECT

39, KING ST. LANCASTER



ELEVATION FACING MARKET ST







## ARCHITECTURAL ASSOCIATION.

THE usual fortnightly meeting of this Association was held on Friday evening last, the President, Mr. G. H. Birch, in the chair. A great many new members were duly elected, and it was announced that Mr. Henry Lovegrove had been elected a member of the Committee of the Association. The annual report of the Class of Elementary Design, which was of a very satisfactory character, was read and adopted, and it was announced that the Class for the Study of Colour Decoration had been re-formed. It was also announced by Mr. Hayes that it was hoped to make future meetings of the Association additionally interesting by the exhibition of drawings, plans, or works of art of any kind, to be lent by the members, and members having anything worth exhibition were requested to communicate with the secretaries.

Mr. H. H. STATHAM then read the following paper on

## ARCHITECTURE AND LANDSCAPE.

Bacon commences his essay "On Building" with the curt axiom, "Houses are built to live in, not to look on." The observation, the truth of which, from one point of view at least, we ought to be ready to admit—for is not the useful the foundation of the true in architecture?—savours of the practical wisdom of a philosopher not to be taken in by shows or pretences; and yet the learned Chancellor forgot one-half the truth. He forgot that houses, or buildings, of whatsoever class, have to be "looked on," whether built for that object or not. Pictures and statues are made emphatically to be looked at, though unhappily they are not always worth looking at; but there is this to be said in their case, that if you are displeased with them, you can always put them out of sight somewhere, or give them away to a friend; or, if a man is unfortunate enough to admire a bad painting, at any rate he does it in private, and his taste is not necessarily imposed on his neighbours or on the public at large. But the case is otherwise in regard to a building. Be it good or bad, there it is; you can neither get rid of it nor hide it. It may be a blot upon the landscape—an annoyance to everyone with senses open to such annoyances; but so long as its owner is satisfied there is no appeal. Indeed, even if it be otherwise, and if the owner or his architect be stricken with repentance for their deeds, the toy is too expensive a one to be removed and replaced. It behaves, then, those who are going to plant such an object permanently on the face of the country, to consider well what they are doing, and to contrive their production so that it may not be a stumbling-stone and an offence to the traveller in search of the picturesque. But this very relation of the building to its surroundings—this self-assertion of the edifice as a portion of the scene in which it stands—if it makes one of the difficulties, ought also to be one of the glories, of the architect; for this is a kind of compensation to him for the restriction of his art in some other respects. It is useless—at least, it seems so to me—to claim for architecture anything like the intensity of interest which belongs to works of art dealing with human feeling and human expression. The most picturesque continuation of wall and roof and turret, pleasing though it be in itself, speaks to us but in an uncertain language compared with that which addresses us from the canvas of a Leighton or a Gérôme, or from the marble fashioned after the thought of a Foley, a Woolner, or a Carpeaux. Nor does the production of a picturesque building require anything like that genius and concentrated study by which alone, and then only with the devotion of a lifetime, the complete power over expression by means of the figure can be mastered. But the architect is the generaliser among artists. The charm of his work is not in itself alone; it is in the understood or expressed relation which it bears to human life on one side, and to external nature on the other. The mansion or the cottage is not the mere stateliness of marble and mosaic, the mere picturesque of timber and tiling. It represents, or should represent, the decoration of the daily wants of life on the one hand, and the relation of that to the grander decoration or scenery of nature on the other. Inside his building he need not disdain attention to the minutest comforts or graces of life; outside it he need not restrict his interest within any narrower limits than are bounded by the visible horizon. For wherever his building is seen it becomes a part of the scene, often the central point of interest in it; it breaks the declivity of the hillside, or it aids

the perspective of the level plain; it rises from the bosom of dark masses of wood, or it looks out like a sentinel from a bleak sea-coast; but in each of such situations, or in whatever other site it may be placed, it will be interesting and suggestive in proportion as its architect has appreciated the predominant character of the scenery, and has known how to render his building in harmony with the genius of the place, and with the perspective and contour of the predominant features of the landscape. At the same time, it is no easy matter to theorise even upon a subject which, from some points of view, appears so vague, and which certainly is scarcely reducible to fixed rules. But hints and suggestions may be gained in looking at what has been done, and comparing the effects of different combinations. Now, in regard to the relation of that most conventional and most refined type of architecture, that of the Greeks, to landscape, there is much to interest us, and a good deal has been said on the subject, and that, it must be confessed, in somewhat contradictory tones. The late Professor Cockerell was of opinion that the Greek temples were specially adapted for effect in somewhat rocky and desolate sites, or that the Greeks specially accommodated them to such sites by giving heavier proportions than in plains; the one statement seems rather contradictory of the other. A contemporary French critic confirms this view, and thinks the temples were designed with special reference to their sites. A distinguished philosopher, Mr. Herbert Spencer, has, on the other hand, expressed the opinion, in an essay which shows how loosely philosophers can write when they get on unfamiliar ground, that regular architecture cannot by any possibility be suited to an irregular site, and that any picture representing such a combination is essentially unpicturesque. Where shall we find the concord of this discord? I think the philosopher must go to the wall. The remarks of Professor Cockerell, in his work on the temples of Ægina and Bassæ, are sufficiently to the point to be quoted. He says that the Greek temples were seldom situated out of or away from cities except on special occasions, as when they were built on the site of some supposed remarkable event. "When temples were thus situated, their remoteness, as well as the grandeur of the scene and the wildness of the country by which they were approached, formed a powerful contrast with the highly-finished object towards which the prayers and footsteps of the devotee were directed. . . . Surrounded by such scenery, we at once admit the fitness of these sturdy and stern proportions, both of the parts and of the whole, so much in accordance with the nature of the site; but so lamentably ineffective in a less conspicuous situation, or when placed in the midst of a crowded metropolis and on a level with the public streets." I understand this passage as referring only to the temples of unusually heavy proportions. The author continues: "So sensible were the Greeks of this fact, that we find different proportions generally adopted when the temple was placed on a plain or in a city. Generally, too, we may be permitted to remark that architects have adopted a low and horizontal system of architecture to a lofty country, and a perpendicular and aspiring one to a level and flat district, as if conscious of the inefficacy of all attempts at loftiness amid the wonders of mountain scenery, and seeking rather by the regularity of art and succession of horizontal lines to present a contrast to these rugged irregularities of nature." Cockerell's remarks clearly point to a view of Greek architecture as a style of contrast to, not of sympathy with, the landscape—contrast, at least, in regard to the lines of the composition. In regard to the relation to the *sentiment* of the landscape, his remarks are not quite consistent, as he in one passage attributes effect to the contrast of the finished object of art with the surrounding rugged scenery, and in another to the harmony of the stern proportions of the building with this same character of scenery. I believe the latter is the correct view. Contrast of the composing lines, and harmony of the general proportion and character of the building and the scenery, are conditions not only perfectly compatible with each other, but which I believe we shall generally find existing in the most fortunate instances of architectural and scenic combination. It is of some interest to note how painters look on the subject, and in what combinations they find their best or most favourite effects. If we take one of the great painters who has made most use of architecture in his landscapes, we find him in a great measure

carrying on the subject for us. Sketching chiefly in Italy, Claude used in his Classic architecture almost exclusively (indeed, I think, quite exclusively, so far as columnar architecture is concerned), the taller and slighter proportions of the late Greek and Roman orders. His "Liber Veritatis" gives a number of instances of the combination of this school of architecture with landscape, often of a more or less picturesque character, but not stern or rugged, and in many instances of a quiet and restful character, where his favourite architecture is combined with sloping banks and foliage. Now, this late Classic of Claude's goes remarkably well with the trees and the rounded contours of the land, but the early Doric, I think we feel instinctively, would not do so, unless in a ruined state; and a building in that condition loses its original character a good deal, and becomes, in fact, more or less a part of nature. There is one curious instance in which Claude gives us castles and towers at the foot of a rocky hill, and a circular temple on the top; this seems to me out of place, rather; but there is this to be said, that, though in a northern climate we connect the idea of inclemency and exposure with a hill-top, the absence of this association in a milder climate may give a different effect. We find, then, in the greatest painter of Classical landscape (unless we except Gaspar Poussin), the Classic columnar architecture associated in the main with landscape either of a quiet rural nature, or with picturesque but not wild or rugged scenes. If we wish to compare with this the impressions of a painter who has shown a special predilection for combinations of Gothic architecture with landscape, we need not go far for instances from a far mightier hand than that of Claude. If the latter is the artist of Classic landscape, Turner is still more incontrovertibly the artist of romantic landscape, and, with that, of romantic or "Gothic" architecture. No painter has more largely employed architecture as an integral part of his painted poems—none has more intensely felt its relation to landscape, its value as assisting and intensifying the feeling of a scene, and as giving point to a composition both in regard to outline and to the opposition of light and shadow. Over and over again we find, in the works of this king of landscape painters, that it is a *building* which gives the key to the expression of the scene—whether it be a tower, rising black and threatening against the light; a minster or cathedral crossing with its vertical lines the level evening sky, or standing as the centre of the radiations of the rising sun, which seem to form an appropriate glory around it; a castle, which seems to stand the one unshakable object amid the driving tumult of a gale on some bleak coast; a spire which sends up a pyramid of light into the sky; or, perhaps, some one small building, insignificant under some aspects, but which has been seized by the painter at the moment when a ray of sunlight has found it out, and forms on his canvas the one spot of high light to which all the rest is subordinate, and in default of which the power and meaning of the work would vanish at once. It surely adds one more motive for our interest in architectural work, both in regard to itself and its relation to nature, to notice how its monuments have been incorporated by scores by the hand of the greatest delineator of landscape the world has ever seen, in works whose poetic power will be felt and admitted as long as canvas and colours can keep them in being. It is worth while to notice also the distinction between the objects arrived at by these two typical landscape painters of the Classic and Romantic schools respectively. Claude, in his sketches and studies especially (and it is in this form that the bent of the artist's nature is most truly discernible), is evidently aiming chiefly at a graceful and picturesque contour and outline composition, and an idyllic grace almost peculiar to himself. Turner is epic rather than idyllic, and it is at broad and massed effects of light and shadow that he mainly aims, many of his "Liber Studiorum" sketches being, in fact, little more than studies of effect, in which outline is secondary, or nearly lost. In the landscapes in which his buildings form such important features, the attention is more directed to the wide sweep of distances, or to the expanse of sunlight and cloud shadows over foreground and middle-distance, than to those picturesque irregularities of rock and foliage composition in which Claude found such characteristic pleasure. And the favourite architecture of the two painters evinces the same kind of contrast, the same leaning towards elegance in the one and towards mass and grandeur in the other; and it would not be



possible to point to a more striking instance of the distinction between the Classic and the Romantic feeling in landscape architecture, than we find on turning from any one of Claude's elegant compositions, with their colonnades fringed by light foliage, to such a threatening mass as that of Kidwelly Castle, painted by Turner—a kind of thing that no one would have thought of painting before the present century, so far have our perceptions of the picturesque altered—may we not say become deepened and extended within a recent period? We shall find suggestive hints, in further consideration of the subject, from some of the specimens of Turner's treatment of architecture and landscape; but the important part which Gothic buildings play in his landscapes may lead to the reflection how far the builders of our Mediæval cathedrals and churches had any view to their effect in regard to the landscape. Generally speaking, I am strongly inclined to think that the feeling for landscape is a very modern one, and I am somewhat sceptical about the perception of picturesque beauty with which the Greeks are credited. The Gothic architects, however, seem certainly to have had an instinctive feeling in regard to the effect of site upon a design, especially noticeable if we contrast the design and position, for instance, of Lincoln Cathedral, with that of the tall thin spires that rise up from the flat country round it, as at Billingborough. There are no landscape painters, no Turners and Claudes of the period, to show us how the building appeared to them as matter for picturesque illustration; but I noticed the other day, in turning over some of the illuminated MSS. at the Lambeth Palace Library (now open to the public three days in the week) some sort of indirect evidence on this point in the filling-in of the backgrounds to the initial letters in one or two works. Leaving, however, the consideration of what painters of the past have made out of architecture in connection with landscape, can we from the hints given us by these, and from other sources, arrive at anything profitable or suggestive towards providing material for painters of the future, by so combining our buildings with the scenes in which they are placed that each shall heighten the effect of the other, and that the building, instead of appearing an intruder on the landscape, shall rather appear to be its natural complement, the last grace added to the scene? If it be said that the subject is vague, that you cannot lay down rules in regard to it, that success in such a combination must be the result of innumerable small circumstances and of generally cultivated perception and sentiment rather than rule—let all this be true (as I think it is), still, that is not a reason for avoiding all consideration of the subject, but rather for urging further attention to it. Does it receive sufficient attention at present? There is a story of a man being brought up at a New York police-court for illegally painting an advertisement on the pavement, and that the charge against him was worded "for defacing natural scenery." Would not the magistrates in some districts have their hands pretty full if all the authors of buildings against which such a charge could be levelled were brought up before them? On this head the remark of a recent French critic is to the point: "It is the *ensemble* of their creations that the modern architects ought to study. It is to commit an error to isolate an architectural monument from its framework by confining the attention to analysing the proportions of the structure, for these proportions should be deduced from the *ensemble*. It is not enough to dispose the masses and study the details without taking any thought as to the surroundings in which the edifice is to be placed. One must recur to the rules of perspective, and compose with nature before the eyes." We may congratulate ourselves in having improved, in the main, the state of things since Repton had occasion to say, in his work on landscape gardening: "I have often seen the absurdity of designs being made for a house where the builder had never seen the situation." Scarcely any architect would do this now; but I think it is true as far as this, that not unfrequently preliminary sketches are made (in pursuit of the useful and perhaps necessary pastime of hooking a client), before the site has been seen; and then the upshot of the matter is that the original idea, made independently of the site, is fitted to the site as well as may be, rather than disturb an idea once formed. And even when the first plan is made considerably in relation to the site, this is done mainly in regard to provisions for aspect, for shelter, and for practical

advantages in drainage and foundations; in short, there is every consideration as to how things will look from the house, but not much as to how the house itself will look when it in turn comes to be regarded as an object in the landscape. Now in reference to this, is not the remark of our aforesaid French critic (M. Alphand, director of Public Works in Paris) considerably to the point, that the architect should "compose with nature before his eyes"? If the first idea of the house, or church, or whatever it may be, were sketched on the spot on the basis of a little sketch of the scene first, would there not be more probability of pleasing and picturesque combination than if the levels merely are taken, and the section adjusted to them on a drawing board? Perhaps, also, photography might be an important assistance in such a case in obtaining, without loss of time, two or three views of a site upon which to test the effect of different combinations. So much by way of suggestion in regard to one form at least of the *modus operandi* which might be adopted in endeavouring to secure harmony between the building and the landscape. Looking at the question a little more generally, in regard to the nature of the problems to be dealt with, we may perhaps consider landscape from an architect's point of view as presenting four different classes of site: hilly country, flat country, wooded sites, and those in contiguity to water, whether on the coast or inland. We noticed the almost universally admitted theory and practice which suggests that the hills should be occupied by somewhat low and solid-looking buildings, and the plains by loftier and less bulky ones. This is not only, however, for the reason mentioned by Cockerell in the quotation relative to the Greek temples, viz., that architects were afraid of seeming to compete with the mountains, but also because the exposed nature of a site on the summit or brow of a hill inevitably suggests the necessity for strength and solidity of construction; the castle-like building of square proportions and massive walls boldly mounts the hill; the more delicate building, with its fragile spirelets and lighter construction, keeps under safe shelter at the base. But this treatment of hill architecture is subject to modifications. Mere elevation is not alone in question, but the character of the eminence also; for what will look well on a bare and precipitous or rocky eminence may look very unsuitable on one of gentler and more rounded character. Looking at Turner's view of Powis Castle, for instance, I should say that a modern architect would make a great mistake were he to place a building of such massive and castellated character in that position in such a scene; as it stands it has the prestige and association of antiquity to hallow it, but as a new mansion it would be a mistake; that regularly-sloped hill with the platform at the top affords a suitable basis for a structure of less stern and more palatial character. So, also, Kilgarron Castle is picturesque enough as a view with an old castle in it, but the wooded slopes indicated would scarcely bear so rude an intruder if in a modern dress. In general, rounded undulating hills require the more modest and ornate treatment of the architecture; square and abrupt ones, approaching to the nature of precipices, demand a correspondingly stern character in any buildings that are to look bold enough to have a right to claim footing on them. And something depends on the manner in which the building is accommodated to the ground. On a comparison of examples, I think it will be recognised that the quieter and more reposeing effect is gained when the building appears to be placed flat on the surface of the ground, even when on a considerable elevation; the sterner and more monumental effect when it is so treated that its basement is at an irregular level, at one point reaching down into a declivity of the site, at another seeming to climb on to a ledge or projection. We see the former effect in Turner's view of Blenheim, which stands fair upon its plateau on a level and extended base with a look of entire repose; this view struck me as interesting also, as it shows Turner for once indulging in a style not unlike Claude in the effect of the Classical foreground architecture and wooded landscape. In Claude's own compositions, it is probably to be attributed to this level base-line that his little circular temples, though placed sometimes on rocks and precipices to match, do not look out of keeping; they have no appearance of really belonging to the situation; they rather look as if they were put down there for ornament, and might be taken

up again. Instances of the contrary effect are seen in the remarkable view of Lillebonne, by Turner. Here the castle seems to rise in the midst like an outgrowth of the rock on which it stands, and into which the outer angles of its towers reach down, while at the inner angles the rock seems to climb up to the towers. Treated thus, a building conveys the impression of being an integral part of the site on which it stands; and (when it can be used) there is no more certain source of architectural power and durability of expression. I have noticed this in such comparatively commonplace things as the tall old Edinburgh stone houses, in High-street and elsewhere, of which the street front looks high enough; but when you come to the back, you find the masonry descending sometimes as many stories below the street level, to find a firm footing on the steep slope; the effect is quite surprising to eyes accustomed to the flat basement lines of towns built on more sober sites. I was much struck with this kind of effect, too, in a fine drawing by Mr. Deshon, in the "Chamber of Horrors" at the last Academy Exhibition (for so the public seem to regard the "Architectural Room") of St. Antonia, Pamiers, where the treatment of the base of the tower, rising from an uneven rocky site, is so bold, that it is difficult to say where the rock ends and the building begins. It is seldom that a modern architect has a chance of realising this kind of treatment; but when he has, it must be his own fault if he fails to produce a powerful and striking effect. Buildings placed on the side or slope of a hill are susceptible of rather different treatment from those on a summit. There is not so much room for boldness, for the building is, as Dugald Dalgetty would have said, "slighted or overcrowded" by the hill, and, in general, a square low form seems the most suitable for hillside architecture. This is especially the case where the hill forms a tolerably regular slope, in which case the form of a rather horizontal building forms a kind of break or parenthesis in the slope when viewed in profile. An instance of this is shown in the view of the summer-house of the Villa Madama, in Percier and Fontaine's "Maisons de Plaisance," and in Turner's view of Mailleraie, where the white house terminating the long slope of the hill is really the point of the picture. Irregular groups of buildings on a hillside are nearly always pleasing, and are a favourite incident with Turner, as in his view of Greville, and in a very effective sketch in the "Liber Studiorum." But single buildings in such a situation are generally best kept long and low in outline; and while a building on the summit of a hill seems to demand some sort of cupola or finish by way of crowning the edifice, on the side of a hill this is lost, and is not needed, as the building never suggests itself as a final point in the composition, but only as an incident *en passant*.

(To be concluded.)

#### THE LATE MR. R. W. BILLINGS.

ON the 14th instant there passed away one who had been for the last forty years more or less prominently before the architectural world; some record, therefore, of his career will doubtless be acceptable to our readers.

Robert William Billings was born in London in the year 1813, and at the age of thirteen was articled to John Britton, the well-known antiquary and author, with whom he remained seven years. This connection naturally fostered, if it did not create in him, a special taste for similar pursuits: accordingly we find him soon after employed with the late F. Mackenzie in illustrating the "London Churches" in an extensive series of views, which were chiefly engraved by the late celebrated John Le Keux. He also assisted Sir Jeffrey Wyattville at Windsor on drawings of the castle there; and prepared numerous views showing the ruins of the old Houses of Parliament after the disastrous fire.

The first publication which he undertook on his own account was the "Illustrations of the Temple Church, London," given both architecturally and pictorially in a very complete manner. In the same way he afterwards illustrated and published "Kettering Church, Northamptonshire," and "Brancepeth Church, Durham." These were followed by still greater efforts, viz.: his important works upon "Carlisle" and "Durham" Cathedrals, from his own careful measurements and drawings; also, an excellent work of the Britton stamp, called the "Architectural Antiquities of the County of Durham." But his



chief production of this kind, and the one by which his name will be mainly remembered, was the "Baronial and Ecclesiastical Antiquities of Scotland"—a noble and exhaustive work in four volumes, containing, besides ample letterpress, 240 beautiful illustrations. This undertaking, though a labour of much love, was necessarily also one involving much time, expense, and research, it being upon comparatively untrodden ground. The interesting variety and fidelity of the drawings are deserving of all praise.

Mr. Billings, among other useful qualities which served him in good stead, was possessed of quick perception, combined with untiring industry. Hence his analytical ingenuity led him to investigate and "attempt to define the geometric proportions of Gothic architecture," as exemplified in the cathedrals of Carlisle and Worcester;—to illustrate by diagrams the "Infinity of Geometric Design," as exhibited in tracery-panels in the former of these buildings; and the "Power of Form," in a small volume which was the last he ever published. He became thus, as may be imagined, an expert in architectural devices and monograms, with which he generally sought to identify such buildings as came under his control; and his practice as an architect was considerable after he gave up the publication of books. Several mansions erected on the banks of the Clyde are from his designs; also the restoration of the Chapel of Edinburgh Castle (for which he was commissioned by Government); the "Douglas-room" in Stirling Castle; Gosford Lodge; restoration of Hanbury Hall, Warwickshire; House at Kemble, Gloucestershire; Crosby Church, Cumberland; and additions to Castle Wemyss, for John Burns, Esq., upon which he was engaged at the time of his death, having built the castle itself many years previously.

With pen, pencil, and it may be added burin, Mr. Billings was alike facile, while his correctness of drawing was most remarkable, expressing where needful all the minutiae of detail. Thus he was equally at home whether drawing upon paper or wood, or etching on steel, as he was occasionally wont to do, many of the engravings in his works being executed by his own hand. Most of these illustrations are on steel, and he was fortunate in the engravers who assisted him. Besides Mr. Le Keux, already mentioned, we find on the list his able son, the present J. H. Le Keux; also, Messrs. G. B. Smith, Saddler, Turnbull, Godfrey, Winter, and others; and, in wood-engraving, the well-known R. Branton, with all of whom he was literally a co-worker. Reference has been made to his skill as a draughtsman, which was especially displayed in his masterly acquaintance with "perspective." The writer of this notice has seen an elaborate early drawing by the deceased, of the interior of the then Covent Garden Theatre, which, if he mistakes not, was rewarded by a public medal; also, the late Professor Cockerell alluded to Mr. Billings' powers in this respect in one of his lectures at the Royal Academy. At intervals of leisure lately he had again occupied himself upon one of his old and favourite themes,—the interior of St. Paul's Cathedral, viewed from the dome; an intricate subject, in which he was endeavouring so to modify the rendering of outlying portions, as they would be determined by strict rules, as to bring them, so to speak, within the range of possible and undistorted vision. This drawing is on a very large scale, and though, unfortunately, far from complete, enough is mapped out to promise a highly satisfactory result, had he been permitted to live to accomplish the whole.

It remains to add a few words of a more general nature. Mr. Billings had for some time relaxed in his architectural occupations, distributing much of his time and services (for he was never idle) between various public institutions and other engagements in which he was interested. In these his aptitude for business, his energy, and his inflexibility of purpose, ever rendered him a man of mark; consequently, his active co-operation was frequently sought, and not unfrequently granted. Among these duties he had for a long period been associated with the Crystal Palace, and he regularly attended its board meetings after he became a director. Nor is it too much to presume that to his practical knowledge and vigilance is greatly due the maintaining of so large a building in constant repair, with efficient improvements as circumstances permitted.

While actively employed in gathering materials for his publications, he naturally resided mostly in the localities themselves; but afterwards coming to London, he lived for many years in

Islington, eventually, however, removing to Putney, where he purchased a good old English residence which had once been occupied by the famous Sarah, Duchess of Marlborough. Such an abode was quite in harmony with his taste, and here he rejoiced to welcome his friends, time after time, with that ready flow of spirits and entertaining conversation for which he was always distinguished. Here, too, he found ample room for the arrangement and display of that extraordinary collection of works of art, and curiosities of every kind, which throughout his lifetime he had felt so much pleasure in accumulating.

J. DRAYTON WYATT.

## ON SCHOOL BUILDINGS AND FITTINGS.

(Continued from p. 633.)

gether. During the summer months the windows afford what is now often called natural ventilation, and an unsparing use of this suffices if the windows reach to the ceiling, and are capable of being freely opened without draughts to keep the school and classrooms fresh and sweet. The best form of window for this purpose I take to be that often known as a hospital-window fitted with a series of casements, each of which is hinged at the bottom and opens by its top falling back inwards towards the room. The external air is freely admitted by these windows, but its current is directed upwards towards the ceiling, and a very ample volume of air will enter without possible draught. It is quite possible to open and close casements so arranged by an apparatus which is simple and effectual, and which I have had made by Mr. Gibbons, of Wolverhampton, and have applied to two London Board-schools. In some hospitals a very costly method of doing the same thing may be seen at work, and committees have been deterred from using this, the best form of school window, by the fear of being obliged to go to great expense in providing gearing by means of which to work the casements. For many months in the year in England, however, it is not comfortable, or indeed safe, to carry on a school with open windows: and during a part, perhaps we may safely say nearly the whole of the same period, heating by some artificial means is necessary. This circumstance offers an inducement, as far as we can, to make the motive power furnished by the heating arrangements effect ventilation also. In small schools, and in all schools where fuel is cheap, the open fire, which every one can understand, is, on the whole, the best means of warming. It is very desirable, however, to combine an inlet for fresh, warm air with the open fire in the grate. Many contrivances for doing this are in use, and it is only necessary here to say that they almost all proceed on this principle of utilising the otherwise waste heat radiated from the back and sides of an ordinary grate to warm a volume of fresh air which is poured into the room. Outlets and flues (adjoining the chimney smoke-flue if possible) should also be provided in order to carry off readily a portion of the vitiated air, and where these inlets and outlets are at all well proportioned to the size of the school or classroom to which they are connected, and are disposed with judgment, they will supply a very considerable and useful amount of constant, insensible ventilation. In large schools it must be held to be the more economical and more scientific course to use a heating apparatus for the whole building. The cheapest apparatus, both as to original cost and probably also as to the amount of heat obtained from a definite consumption of fuel, will be hot-water pipes carried into the schoolrooms and classrooms, and exposed in the rooms. My belief is, that a system in which the fresh external air is heated within a chamber in the basement by contact, not with a furnace, but with a mass of low-pressure cast-iron hot-water pipes, or flanged vessels, and is then conveyed through flues or channels to each room of the building, is the best system of warming for a large school. Corresponding flues or other suitable outlets being provided for the outgoing current, of course provision must be made for it in the original construction of the building, and it is not cheap. If, however, efficiently done, as it has been for me by Messrs. Price in one instance and Mr. Boyd in another, it provides at one and the same time warmth and fresh air. Having described the Prussian system of school-building, especially as exemplified in the schools built for the London

School Board from his designs at Jonson-street Stepney, and which have been fully described and illustrated in the BUILDING NEWS, Mr. Smith said that this class of school, though the time has not yet fully come for it to be built in this country, is the elementary school of the future. It, or something very like it, is the middle-class school of the present day, or to speak more correctly, the leading principle. A classroom for every class and a general room for assembly, is the leading principle upon which middle-class schools are being designed, built, and conducted. I may refer to the Cowper-street Middle-class School, the magnificent new Merchant Taylors' School, and the schools proposed to be built by the Grocers' Company as examples of the classroom system. As time goes on there can be little doubt that elementary schools will conform to this model. Already taking one of Lancaster's schools of 70 years ago as at one extreme of the scale, and a complete Prussian school as the other, the planning of English school buildings has advanced at least half-way. By slow degrees a greater and greater amount of isolation for the classes has been introduced. Of the fittings required by a school, the benches and desks are by far the most important, not only because they are wanted in large numbers, but because they directly influence the success or failure of instruction and discipline, and their size and arrangement dictate the dimensions and shape of the schoolrooms and classrooms. The desk is required to accommodate the book for reading, the slate for cyphering, the copybook for writing, and perhaps the music-book for singing, and it must provide storage for books not in use; its height, slope, shape, and distance from the bench must be regulated accordingly. I will dismiss at once those hybrid contrivances in which the unfortunate desk is also required to form part of a tea-table or to disappear altogether and become the back of a church bench, believing that every such complication adds to the difficulty of making it efficiently perform its legitimate functions. The bench ought to be exactly at the right height for the pupil, both as regards its height from the floor, its height below the desk, and its distance from the front of the desk, and it ought to be of the right shape for easy sitting. The length of the desk and bench, and the spacing generally, are to be regulated by the desirability of gaining easy access to each child's work. In many old schools these conditions are barbarously violated, and Mr. Liebreich has demonstrated the necessity of closely studying the requirements of the pupil. The old desks sanctioned by the Committee of Council were in long lengths, and confusion necessarily arose when a child near the centre had to enter or leave. Many improvements have been lately brought forward. The one adopted in London by the London School Board is what is known as a dual desk, that is to say it is a desk and bench only long enough for two children; the desks are forty inches long, are placed five deep, and between every two sets of desks a gangway is left of 16 inches wide, which gives access both for teachers and children. The seat inclines very slightly, and has a back rail at a moderate height, rather higher for pupils than for boys, and a footboard. An essential feature, and one which has been attacked by some school managers and by many school-fitting manufacturers, as open to objections, is a rising flap to the desk. When this flap is down, the sloping part of the desk is a foot broad, and its front edge is exactly over the front edge of the seatboard, a position very convenient for writing, but not allowing of the pupil to stand up in his place. The front five inches is hinged, and when turned up leaves ample space for the pupil to stand, and also itself forms a good desk for music. This contrivance permits great economy of space, and when the children are drilled in the use of it, seems to give satisfaction. Below the desk is a bookshelf, and there is in the back of the desk an ink-well and an opening for a slate to each pupil. The standards are of iron. This fitting is extremely complete, and on a level with anything in use elsewhere, except perhaps in the best German schools; it is also expensive, as might be expected, from its elaboration. In Sweden and in America each child has a separate desk and seat, and in Sweden the difficulty about obtaining standing-space with a seat and desk in proper relative positions for writing is met by making a flap-seat in place of a flap-desk. When economy is of importance, it would be worth while to try whether the principal features of these desks and benches could not be re-



tained without iron standards. Stout wood is very durable and very strong, and plain fittings entirely of wood, could, I think, be designed and constructed at somewhat less cost than the mixture of materials now in fashion necessitates. The other fittings of a school, while of course they require care, are not of the same vital importance as the benches and desks, and need not be dwelt upon here. Nor shall I attempt to do more than name, and that in the most cursory way, some of the miscellaneous matters of which the school architect ought not to lose sight. It is indispensable to a well-ordered school for it to have ample water supply and efficient drainage; proper lavatories; sufficient cloakrooms and caprooms; adequate conveniences in a detached building, approached under cover, and of simple construction; a covered playground to each department; a supply of pure drinking water for the children; a classroom so lighted as to suit a drawing-class; in some girls' schools a classroom of large size as a needlework-room; one or more teachers' rooms; accommodation for a resident caretaker, or sometimes a teacher's residence; storage for fuel, and sometimes a committee-room ought also to be provided in every complete school. There should, if possible, be no corridors, and where they occur they must be roomy, direct, and well lighted. A playground of size is also necessary for each department, and there should be provision for lighting it on dark evenings, if there be gas in the buildings. If possible, the entrance for boys should be in a different street from that for girls and infants; at any rate it should be distinct.

#### SANITARY CONDITION OF TOWNS.

A PERIODICAL visitation of some form of fever—typhoid, for instance—has set the sanitary authorities of some of our provincial towns on a vigorous inspection of their weak sanitary points, and has created no little stir in some quarters. Over-Darwen we have lately heard great complaints about; in fact, sewage there has been allowed to stagnate before the unconcerned eyes and noses of the inhabitants without so much as a suspicion of its danger, and not until Nature had imposed her hard penalties on some hapless victims, was an inspector sent, and the mischief has been partially averted. We have lately heard also rumours of like import from the south. Winchester, generally known as a highly-favoured locality seated on a mass of chalk, and in its higher parts eminently suited by its bracing air to restore the exhausted functions of the delicate and phthisically disposed patient, has come in for a little share of popularity on its sanitary account. If its good citizens were foolish enough to spend the ratepayers' money on a costly Town hall for its Corporation, when the same amount would have gone far towards rectifying past blunders in sewerage, or, at least, in laying down a new and improved system of drainage, they must reap the consequences of such a displacement. Winchester did not want architectural embellishment. Her own Cathedral, College, and other antiquities in the immediate neighbourhood satisfy all comers; but she did require a system of sewerage instead of the cess-pool and pollution scheme now existing, in the first place, to retain her character as a healthy city, and in the next to render the stream pure and undefiled; for besides her own account other towns have a claim upon the purity of the water. Southampton draws its water supply from the same source, and we think the sooner both these towns set about a scheme of sewage utilisation, the better it will be for both of them. In the latter town we find also the subject of sewer ventilation is being ventilated again, and the inhabitants will, it is hoped this time, set an example as a seaport town, with tidal-locked sewers, of adopting shafts or sewer ventilators in the streets. *Experientia docet* seems to be the only motive power among some people; they wait for a Regent's Canal Explosion to remind them of their insecure condition amid explosives in transit, as well as their proximity to pyrotechnists and gun-powder magazines; they wait till some one calls attention to their sanitary condition; or till some of their inhabitants fall victims to zymotic diseases, and then their fervour or temerity becomes a valuable power to them.

The Sultan of Turkey is about to erect a magnificent mosque in the Moorish style, near Dolma-Bagiche. Serkis Bey is the architect.

#### ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETIES.

OXFORD ARCHITECTURAL AND HISTORICAL SOCIETY.—The first of the Saturday walks this term in connection with this Society took place on the 14th instant, when the party assembled beneath the "village tree" at Ifley at 3 o'clock, and the Rev. Edward Marshall delivered an address on the early history of the Manor of Ifley. At the church, the Vicar, Dr. Warburton, met the party. Dr. Warburton thought that the church dated from the earlier part of the twelfth century, and not the latter part. On entering into the church he spoke of the font and its symbolism, and proceeding up the nave described in detail the arches and windows, and in the chancel he contended that the irregular splay of the piece of wall between the old and new work was evidence of the probability that there was once a still older church than either on the spot. From thence the party were taken to the Rectory House, and shown a very curious window. They also saw one or two of the rooms, and the south front, which are all very characteristic of the time of James I., though in general aspect, Mr. Parker said the house might be taken at first sight to be of the time of Henry VIII.; the windows have all stone mullions. The excursion last Saturday was to Abingdon, where St. Helen's Church and the Wesleyan Chapel were visited, and Culham. A meeting of the Society was held on Wednesday week in the Taylor Building, when Mr. C. H. E. Carmichael, M.A., Trinity College, read a paper on "Recent Discoveries of Early Christian Inscriptions in Sicily and Northern Italy." The annual meeting for the election of officers and the Committee was held on Wednesday evening, the 25th instant.

#### COMPETITIONS.

CAPE COLONY.—Our correspondent says:—The Commission appointed to decide in the matter of designs for new Houses of Parliament has arrived thus near to a final decision. The designs of "Alma" were voted for by 3 members, and those of "Spes Bona" by 4, those of "Alma" being preferred for their elevations, and those of "Spes Bona" for internal arrangements. The minority were, however, so strong that the Commission decided that it should be left to the two professional members, Mr. M. R. Robinson, M.I.C.E. Chief Inspector of Public Works, and Col. Westmancott, R.E., to consult upon the two designs, and if possible arrange to accept each conditionally and combine the one with the other in carrying out the work. How the matter of premiums will be settled one cannot say. It would appear most fair to divide the sum of the first and second premiums between these two competitors should this idea of amalgamating the two designs be adopted. "Spes Bona," it is believed, is a Colonial competitor. It is proposed to offer a premium of 200 guineas for the best sewage scheme for the city of Cape Town. The competition will no doubt be open to English engineers. In taking over my notes of August last you said £45,000,000 to be expended upon railways; it should have been £5,000,000. The new Theatre in Cape Town, now almost completed, is pronounced to be of faulty construction, and likely to fall in upon the first occasion of a full house.

LIVERPOOL.—The four competing plans of the proposed church of St. Lawrence, Kirkdale, were formally opened on Tuesday by the committee, in the office of Messrs. Master and Fletcher, North John-street, where they will remain on view until Wednesday next.

THE MARGATE DRAINAGE COMPETITION.—At the meeting of the Margate Town Council on Tuesday week, a letter was read from Mr. Eachus, the author of the plan "Experientia," in which the writer said that on referring to the recent resolution of the Council on the matter of the competition the members seemed to have come to that resolution on the assumption that he had not fulfilled the conditions in two respects. First, that he did not furnish a complete plan for the drainage of the borough, but he contended that he had done this according to the instructions furnished by the Surveyor. Secondly, by not providing for the drainage of the basements in the low-lying districts. On this latter point, however, he begged to refer the Council to his report, wherein he pointed out what a saving would be effected if these were filled up. He also contended that they could not carry out the drainage according to Sir Joseph Bazalgette unless they

adopted his system of intercepting high and low level sewers, and he held that as far as the estimate was concerned it was hardly fair to compare his irrigation scheme, in which there would be a return, whereas there was no return for the outlay in the schemes for going into the sea. A letter was also read from Messrs. Gotto and Beesley, authors of the plan "C.E.," in which they stated that they saw in the papers that the amended plan of Mr. Lewis Angell was to be considered at the next meeting. Before this plan was opened by the Council they respectfully wished to draw their attention to the letter they (Messrs. Gotto and Beesley) sent on the 19th of October, which they hoped would be taken into consideration, as they had as yet received no reply. Mr. Lewis Angell's amended plan was then produced. After the reports and estimates had been read, Mr. Sear moved that the plan, sections, &c., be placed in the Town-hall for the inspection of the members, and this was carried. On the letter of Messrs. Gotto and Beesley being read a second time it was resolved that the Town-clerk acknowledge the receipt.

## Building Intelligence.

#### CHURCHES AND CHAPELS.

BRISTOL.—On Wednesday week the new Roman Catholic chapel of St. Joseph, Cotham, was opened. The basement is designed for refectory, offices, &c. The style is devoid of any ornamentation. The chapel is of Stapleton stone and red brick, with a pointed slate roof. The extreme length is 74ft., and the width 27ft. There are a nave and chancel, and the arrangements admit of sick inmates of the house occupying a gallery, access to which is gained from the dormitories. Mr. Gay was the contractor, and the total cost will be nearly £2,000. The open seats which are placed in the chapel will accommodate about 150 worshippers.

LINCOLN.—The ancient Norman font of Lincoln Cathedral—the work of the first Bishop, Remigius—after a long period of disuse, extending probably over some centuries, was on Friday week rededicated to its sacred purpose. The font of Lincoln Cathedral is of the same form and character as those of Winchester Cathedral, East Meon, and St. Michael's, Southampton, and may well have been the work of the same craftsman. The basin is hollowed out of a huge mass of black basalt, three feet square, supported on a central cylindrical stem, with four columns at the angles. The faces of the font are decorated with rudely sculptured gryphons and other mythological animals. This font served originally for the parishioners of St. Mary Magdalene's, who, on the demolition of their church by Remigius to erect his cathedral, had the right reserved to them of meeting for worship in the minster. Early in the fourteenth century a district church was erected for the parishioners by Bishop Oliver Sutton, but they were still bound to bring their children for baptism in the cathedral font. It is not known when this rule was relaxed. The font was ejected from the nave by Essex just a century ago, together with all the sepulchral slabs, processional stones, and other objects of interest, with the view of reducing the nave to a grand unbroken vestibule, and placed in the Morning Prayer Chapel. This chapel, after a century of disuse, has been once more dedicated to its true purpose in an early service for the theological students and cathedral workmen, and the font has resumed its original place under the second southern arch of the nave, standing over its ancient water-drain.

LITTLE ASTON, STAFFORDSHIRE.—On the 19th inst. this little church was consecrated by the Bishop of Lichfield. The church was erected from designs by Mr. G. E. Street, at the sole cost of Mr. E. S. Parkin-Jervis. Mr. Richard Yates, of Shiffnal, was the builder, and Mr. J. W. Randall the clerk of the works. The church cost about £5,500, exclusive of the value of the ground.

LITTLE HOUGHTON.—The parish-church of Little Houghton has recently undergone extensive alteration. Formerly the church consisted of nave, south aisle, and chancel, and the present old embattled tower. A north aisle and an organ-chamber have now been added, while the old part of the edifice, with the exception of the tower, has been substantially rebuilt in the Decorated



style. The tower arch has also been displayed by the removal of an ugly west end gallery. The church has been entirely re-seated with open seats of stained deal. The restoration, which cost about £3,000, was carried out from the designs of the late Mr. Buckridge, by Mr. Gee, of Daventry. Several new features have been added to the chancel. A new east window has been erected, and a new reredos constructed. The east window, which is by Messrs. Ward and Hughes, represents Christ appearing in the midst of His disciples after the resurrection, and bears the inscription, "Peace be unto you." The reredos consists of three panels, the left-hand compartment representing the Annunciation, that on the right-hand the Adoration of the Magi, and the central compartment Our Saviour in His glory. Two memorial stained-glass windows have also been erected on the south side of the chancel. These are by Messrs. Clayton and Bell, and represent the parable of the Good Samaritan, the feeding of the hungry, and clothing of the naked.

**READING.**—The foundation-stone of a new Primitive Methodist chapel was laid at Reading on Tuesday week. The chapel will be built with red brick, relieved by white brick tiers. It will be 32ft. by 50ft., and will accommodate about 280 to 290 persons on the ground-floor. The floor of the chapel is raised 8ft. above the street, and the ground is excavated 4ft. for a basement story, on which a schoolroom, 32ft. by 35ft., and two good classrooms, are obtained. The cost of the building will be £1,190, not including schoolrooms. The building externally will be of plain simple character of red brick, with Bath stone and white brick dressings. Mr. C. Smith, Friar-street, is the architect, and the builder is Mr. G. Reavell, of Windsor.

#### BUILDINGS.

**GLASGOW.**—The new buildings for the Clydesdale Bank, Glasgow, just completed in St. Vincent-place, present a frontage of 85ft. The style is Palladian, with a richly ornamented front. The building possesses all the appurtenances of a great banking establishment, including, of course, an ample safe, the walls of which are of granite 6ft. thick. The buildings cost about £35,000, and the architect is Mr. John Burnet.

**MARYHILL.**—The new barracks at Maryhill, Glasgow, are nearly completed. They were commenced more than five years since, when the contract for £100,000 of Mr. John Kirk was accepted. After a year's labour, a dispute arose between Mr. Kirk and the Government engineer in charge relative to the size of the stones used, and Mr. Kirk, after finishing the wall, and erecting two or three of the buildings to the first floor, threw up the contract in 1871. For two years nothing further was done, and the works were allowed to stand as Mr. Kirk had left them. The dispute is still in Court, and Mr. Kirk, senior, has died during the dependence of the process. The War Office having again had their attention drawn to the subject of barrack accommodation for Glasgow, purchased, in addition to the original site of 30 acres, the outlying ground to the west, measuring 27 acres, and the original plans were extended to embrace cavalry and artillery quarters. The War office took the extension and completion of the works into their own hands, and in September, 1873, operations were resumed under the direction of the Royal Engineers. The erection is three stories in height. The quarters to the east for the staff-sergeants and married sergeants are completed and partly occupied, and the quartermaster's stores, barrack stores, officers' guard-rooms, officers' stables and washing houses, &c., are completed to the fittings. The infantry barracks are pretty far advanced. There are three blocks two stories in height for the married men. Four three-story blocks for single soldiers are built up to the last story, and the smaller buildings are nearly all completed. The infantry quarters have accommodation for 97 married men and their families, and 744 single men—in all 841 men. The cavalry and artillery quarters, which, as stated, form an addition to the old plan, consist of seven blocks—two for the married men, and five for single men and for the horses. The accommodation is as follows:—Artillery, 138; cavalry, 132; married men, 32; and officers, 12—in all, 314 men. The stables are fitted to accommodate 114 cavalry horses and 102 artillery horses. There is also being erected an infirmary for horses, with 14 stables, and a gun-shed for 8 guns. The hospital for the men has not yet been begun, but it will occupy the highest part of the grounds, on the new purchase, outside the original wall. It

is to have 32 beds for patients, with accommodation for officers, nurses, surgery, &c. The canteen is also to be erected on the new grounds, and is to be on an extensive scale. In addition to the bar, there will be amusement-rooms, library, and reading-rooms, and other inducements for spending evenings within the walls. The plans also show that the educational and religious wants of the occupants of such a large establishment will not be neglected. The foundation of a large chapel has been laid, and the schoolrooms, gymnasium, &c., are all but completed.

#### SCHOOL.

**WALWORTH.**—New Board schools were opened on Tuesday, at Walworth. They consist of two separate buildings, one devoted to the use of the infants, of one story in height, and the other of three stories, devoted to the boys and girls. The elevation of the building is plain, but a good effect is produced by the introduction of Portland stone bands, to relieve the stock-brick facings and the red-brick dressings. The school will accommodate nearly 1,000 children, and has been erected by Messrs. Cook and Green, contractors, from the designs of Mr. E. R. Robson, the architect of the Board, Mr. R. Walker acting as clerk of the works.

#### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

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Front Page Advertisements 9d. per line.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

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Cases for binding the half-yearly volumes, 2s. each.

Subscribers receiving their copies direct from the office are requested to observe that the last number of the term for which their Subscription is paid, will be forwarded to them in a coloured wrapper, as an intimation that a fresh remittance is necessary, if it be desired to continue the subscription.

RECEIVED.—T. P.—R. M. and Co.—M. Bros. and Co.—E. D. and Co.—S. and P.—W. A. A.—E. L.—W. C.—J. P. L.—H. T.—D. and Co.—A. R. D.—E. and E.

W. W. (The Manchester Limer Asphalt and Concrete Co.) is the only concrete-building firm at present advertising in our columns, and we believe its system is as good as any and better than many. We know very little of the first two names you mention, and the third failed some years since. Drake's Concrete Building Co. has always had a good reputation, and has carried out some important works in various parts of the kingdom, several of which have been illustrated in our pages.—J. SNAITH, Ithaca, N.Y. (subscription paid for both to Oct. 29, 1875. Such plans and particulars as you offer would be acceptable).—A. B. is informed by the Text book treats on the valuation of property, and is published by Luckwood and Co. Hurst's handbook is a smaller one, and contains a useful compendium on those points "A. B." requires to know.—B. (We cannot say without seeing the drawing. The lithographic process does not hurt the drawing).

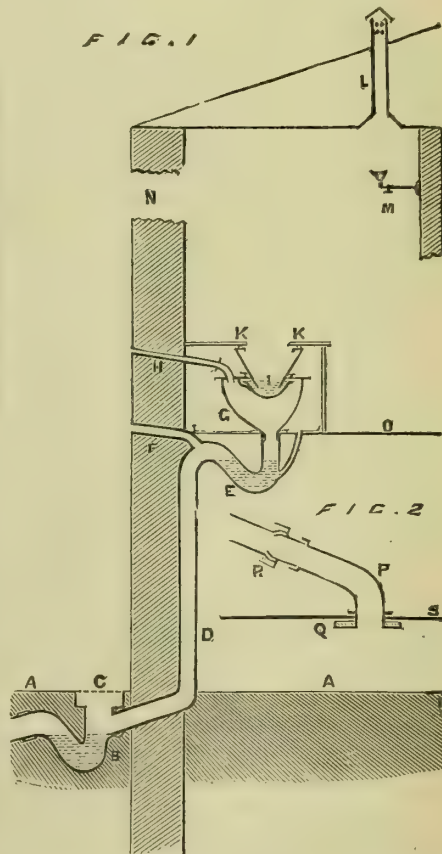
## Correspondence.

### A SCIENTIFIC AND SAFE WATER-CLOSET.

(To the Editor of the BUILDING NEWS.)

SIR,—Many people of late have been troubling their minds very much as to whether or not their water-closets were safe, and I could not help being amused at some of the observations made. One gentleman, e.g., made the remark that he felt bound to believe in the truth of the statement he had heard that gases came through water, for, continued he, "When I sit down upon our w.c. I feel a cold draught of air which is anything but agreeable." Now, this "cold draught" complained of here is a common complaint; it does not, however, come up either the soil-pipe or through the water in the trap; it is generally a current of fresh air coming up between the flooring and the wall, and which, taking any opening it can get, blows out between the top of the water-closet basin and the bottom of the water-closet seat. This can be easily cured by simply fixing on with tacks to that portion of the under side of the wooden seat right above the rim of the water-closet basin a piece of  $\frac{1}{2}$  in. thin indiarubber tube about 4ft. long.

As to how to put up a water-closet from which, so far as it and its pipes are concerned, all danger from sewer gases may be practically debarred, the following sketch will easily show, and it is because such explanatory sketches and other drawings so often and so freely appear in it that the BUILDING NEWS appears to me to take the first place amongst the weekly architectural and building journals of the day.



The above sketch is intended to show a sectional view of a water-closet in the upper story of a two-story house. A A is the level of the surface of the ground at back court and of the kitchen floor. B is a 6in. vitrified fireclay siphon-trap with an open iron grating, C, at its top, which grating may be hinged. D is a  $4\frac{1}{2}$  in. soil-pipe from the water-closet; it is here shown coming down inside the wall; in other cases it may be carried down the outside. One advantage of such pipes being carried down the inside is that they are more likely to be protected from frost. F is a  $1\frac{1}{2}$  in. or 2in. lead pipe for ventilating the soil-pipe. In this case it is carried through the wall, in other cases it may be carried up through the roof. G is the water-closet trunk, made of iron, it being a pan water-closet which I have shown. Had it



been a Bramah water-closet the pipes would be all the same. H is a  $\frac{3}{4}$ in. lead pipe carried through the wall and put in to ventilate the trunk, or that space between the water in the pan I or basin J and the water in the siphon-trap E. This  $\frac{3}{4}$ in. ventilating pipe H is a very important pipe, and its use ought to be the rule in place of the exception, as is at present the case. It works as follows: When the handle of the water-closet is lifted, then any foul air lying in the trunk, in place of coming out into the apartment, is sent outside with a rush through this pipe H; besides, being open to the air, it tends to prevent the accumulation of such foul air in the trunk.

In order to keep the outer orifices of the pipes F and H always open, it is a good plan to solder on one or two pieces of copper wire across them. J is the water-closet basin, and the two small circles shown underneath KK are the indiarubber pipe spoken of in the opening remarks. L is a  $\frac{3}{4}$ in. zinc ventilating pipe carried up through the roof to ventilate the space or inclosure in which the water-closet is situated. M is the gas bracket right below it, helping, when lighted, to cause an upward current. The empty space at N is supposed to be the water-closet window. O is the surface of the floor of the upper flat.

Where a water-closet is fitted up, as shown above, and the hole at the bottom of the wall where the soil-pipe passes through, built up with Roman cement, then all danger from sewer or drain gas is fairly past. Further, no gas can accumulate in the soil-pipe either, for the pressure of the atmosphere on the surface of the open grating C tends to send a current of fresh air through the soil-pipe and out at the ventilating pipe F. The principle shown in the above sketch also applies to fixed wash-hand basins, baths, kitchen sinks, &c. In place, therefore, of people, especially those who can afford to pay for having a thing done properly, talking about banishing all their water-closets, fixed basins, and baths out of their houses, let them have them put up in some such manner as above, and they will be as safe, if not even safer, with them than without them. So much for the water-closets; and as to the drains, if any go through the house, see that they are properly and solidly laid, and also well jointed with cement, especially in the bottom, the neglect of this latter is often the cause of both chokage and bad smells, as well as of dampness rising up the walls. It is a common but very annoying masonic practice to touch up the joints most artistically upon the top while the bottom is left quite open.—I am, Sir, &c.

W. P. BUCHAN.

P.S.—As it is possible some may ask how to connect the  $\frac{3}{4}$ in. ventilating pipe H to the iron top or cover plate of the water-closet trunk, so that it may be firmly attached, and also readily detached when required, I may say that I take a  $\frac{3}{4}$ in. brass screwed ferrule P, Fig 2\*, and in this case fit on a brass nut Q upon its screwed end. To the plain end I solder a  $\frac{3}{4}$ in. brass gas coupling, R; then to the end of this coupling R the  $\frac{3}{4}$ in. lead pipe is soldered. By means therefore of the coupling R the cover-plate—S shows a portion thereof—can be easily got away or detached when wished. For a Bramah water-closet a straight ferrule may sometimes be more suitable than the bent one P, as the ferrule in the case of the Bramah will be let into the side of its small trunk.

27, Renfrew-street, Glasgow.

## THE CONSTRUCTION OF WAREHOUSES AND WORKSHOPS.

SIR,—With your permission I should like to compare the figures given in a paragraph (foot of p. 620, left-hand column) of Mr. Homersham's paper on this subject, in course of reproduction in the BUILDING NEWS, with those given in Hurst's Handbook, 1865. The discrepancies, as will be seen, are remarkable, and Hurst stands greatly in need of reform if Mr. Homersham's tables, or those on which his paper is based, are reliable.

Homersham: "A hollow column of cast iron, 7ft. 6in. in height, by 6in. in external diameter, having a thickness of  $\frac{7}{16}$ in., will carry with safety, when securely fixed, 50 tons."

Hurst, p. 20: "A hollow column of cast-iron 8ft. in height, by 6in. external diameter, and  $\frac{7}{16}$ in. in thickness, will carry 27.2 tons safe load.

Difference, 22.8 tons.

\* What we use for attaching our lead house-supply pipe to the Water Company's iron main pipe in the street, as shown by Fig. 195, p. 132 of the BUILDING NEWS for August 8th, 1873.

Homersham: "For a column 7ft. 6in. in height, to carry 115 tons, a good proportion is kept by making the external diameter 8in., and the thickness of the metal  $\frac{1}{2}$ in. full."

Hurst: "For a column 8ft. high by 8in. external diameter, and  $\frac{1}{2}$ in. metal, the safe load is 58.3 tons.

Difference, 56.7 tons.

Homersham: "If the height of the column of cast iron be increased to 12ft. 6in. and the working load be 115 tons, then the diameter and thickness may be respectively 10in. and  $\frac{15}{16}$ in."

Hurst: "Height of column 12ft., external diameter 10in., thickness of metal  $\frac{1}{2}$ in.; safe load, 67.1 tons.

Difference, 47.9 tons.

It will be noticed that the heights are not quite parallel in either instance, and that in the last there is a difference in the thickness of metal. The first two being slightly against Hurst, the third in his favour.—I am, Sir, &c.

G. K.

## DWELLINGS FOR THE INDUSTRIOUS CLASSES.

SIR,—I read with much interest the account in your valuable journal of the new dwellings for the industrial classes, erected in the Farringdon-road, and I quite agree with all that is said respecting the fireproof construction and the avoiding of certain errors in former efforts of a similar kind; but I must say I cannot think that the arrangement of these dwellings is on the best principle. I happened to be going past a week or two since, and took advantage of the opportunity for inspecting them. The two defects in the plan which struck me most were that the bedroom or rooms open out of the living-room, and the w.c. is *inside* each dwelling. All bedrooms should, I think, in order to be perfectly healthy, open direct from a passage or lobby, because if they do not, you are very likely to have a vitiated atmosphere throughout the dwelling during the 24 hours, for, as you mention, I noticed some of the ventilators covered over, and I have found the greatest difficulty in persuading men who have been sleeping in an apartment to open the windows the first thing in the morning. The result of a bedroom, under such circumstances, opening into a living-room is that the air in both becomes impure, from the communication established by the door, and at night, when the air in the living-room is rendered impure by occupation, and effects of gas or lamps, the bedroom partakes of the evil. There are other reasons, which I need not name, why the bedrooms should not be entered from the living-room. With respect to the w.c.'s, there ought invariably to be an open space between them and the dwellings. This is not the case in these buildings, as they open direct into the lobbies, and when the doors are open, the interior can be readily inspected from the living-rooms. That dwellings can be arranged to avoid both these evils, I am quite sure, and I hope in future such will be the case.—I am Sir, &c.,

CENTURION.

## ST. PAUL'S.—SHALL IT BE "DECORATED" OR "PAINTED"?

SIR,—Your correspondent "C. B. A.," writing under this head, has fallen into error in one of his statements, which perhaps you will allow me to correct. He says that to cover the whole of the surface with three or four coats of common stone-colour "was Mr. Penrose's notion of 'adorning' St. Paul's." Now nothing could really be further from the truth. The exact opposite is the fact. I have been connected with the Cathedral for over twenty years, and during that time have had frequent opportunities of hearing Mr. Penrose's views upon the matter, and I can confidently affirm that never did such an idea enter his head. On the contrary, he has continually deplored the old painted surface, and has been actually engaged, for the past eight years, whenever enabled to do so (especially during the last two years), in directing the removal of the paint.—I am, Sir, &c.

G. M. D.

## SEWER GAS.

SIR,—As the subject of the pressure of sewer gas in drains and soil-pipes engages general attention, with but vague results, could you not induce your excellent correspondent "Plumber" to make some simple experiments with the view of giving us facts. Until we have had the pressure measured we cannot properly devise means to resist it. What I propose is a series of readings from an ordinary gas pressure gauge, to be fixed on soil-pipes near and under the trap, accompanied with particulars of the means of ventilation which are provided. Some barometrical comparisons also between the air on the surface of the street and in the sewer beneath it would be useful.—I am, Sir, &c.

M.

## Intercommunication.

### QUESTIONS.

[3556].—Day Wages.—What, in a builder's day-work bill, is the proper profit to add on the workman's wages?—the standard rate of wages being 8d. per hour. I have had bills sent to me for the same sort of work by different masters, priced at 8jd., 9d., 9½d., and 10d. respectively. Is there not some recognised rate of addition? Perhaps "F.," who answered so lucidly my question on "prime cost," would favour with a reply?—L.

[3557].—Cement Mortar.—What are the proper proportions of Portland cement and clean, sharp London pit sand for use in ordinary work, in which unusual constructive strength is not required, such as the rebuilding of city party walls, or the addition of a portion of new building to an old one, where it is desirable to take precaution against a shrinkage or settlement of the new work from the old? What, in fact, is wanted, is a cement mortar not too extravagant in price, to take the place of ordinary lime mortar, and at the same time not too "short" from excess of lime to prevent the striking of a decent joint?—L.

[3558].—Strength of Iron Columns.—As, according to all the formulæ, the length of a column is an item not to be overlooked in the calculation of its strength, it is important to know what is considered to be the length of columns in their ordinary use, as for instance, in a tier placed one over another, supporting a series of warehouse floors. Is the height of each separate column to be taken in calculating its strength, upon the assumption that the girders which it immediately supports sufficiently tie its head and render it immovable and secure as a base for the next column above it; or should it not be considered that the whole series of columns from bottom to top are one entire column, and in calculating its strength should not the whole length be taken into account?—L.

[3559].—Tracing-Cloth.—Can any one inform me how to make tracing-cloth take Indian ink well?—H. J. H.

[3560].—Bronzing Plaster Casts.—Would some reader kindly inform me how plaster casts are bronzed? I have lately seen some in which it was difficult to detect the imitation.—A. BURR.

[3561].—Cement for Slating.—What is the best cement I can use to fillet slating? I hardly think Portland cement so good as a more tenacious kind of composition, as white lead? Is there any cheap composition sold for such purposes? Portland cement cracks, and the wet drives through.—INQUIRER.

[3562].—Wire Gauze over Ventilators.—Is it likely that the chilling descent of cold air into a public building through perforated discs in the ceiling would be lessened by covering them with fine wire-blind gauze? The largest of these discs in the building referred to is over a star-light. Would not the gauze in this last case (and elsewhere also, to some degree) get heated from below, and thus warm the air as it passes through its fine meshes? This, I take it, is the principle of the respirator, and the device may be an expedient in ventilation upon the value of which some correspondent may be able to throw light.—X.

[3563].—Ancient Lights.—I have a dilapidated external wall in which are some valuable ancient lights. Will the temporary extinction of the lights by taking down the wall for the purpose of rebuilding lose me my right to the said lights?—S. L.

[3564].—Chimney Shafts.—As a reader of your paper, will you kindly inform me, in next number of the BUILDING NEWS, if you know the best work of the present day upon the building of chimney shafts (to include the various kinds of cowls, &c., in general use for preventing smoking)?—A. BURGESS.

[There exists no work of special kind that we are aware of on the subject of shafts. Architects and antiquaries have been prolific in pouring forth designs for chimneypieces, carved work, and almost every species of decorative detail; but, singular to relate, they have scarcely written a single book on the useful adjuncts of buildings, as chimneys, cowls, and other important parts. As far as preventing smoke is concerned, the Archimedean screw cowl is one of the best terminations to create draught and prevent the return of smoke; we may name also Billing's patent cone.—Ed.]

[3565].—Valuations.—Will some valuer of experience suggest two or three books bearing on the practice and law of valuations for assessment?—KNOWLEDGE.

[3566].—Stable Ventilation.—Is there not some kind of ventilator in use for stable purposes? I want to know what kind is recommended where a stable loft intervenes?—COUNTRY.

[3567].—Quantities of a King-post Truss.—Which is the best and simplest plan of proceeding in taking out the quantities of timber? Will some correspondent enlighten me?—LEARNER.

[3568].—Measuring Masons' Work.—Can any reader give me some information respecting the most approved method, out of the diverse modes adopted by different surveyors, on this very unsettled class of measurement?—STUDENT.



[3569].—Slate Tank.—I should be obliged if some correspondent will tell me how to construct a good and cheap tank of slate, and what thickness should the slabs be? The tank must be 4ft. by 2ft. 6in. and 3ft. deep?—PURE WATER.

[3570].—Filters in Cisterns.—Which is considered the most efficient filter for cistern use, and one which entails least trouble? I have been recommended one of the charcoal kind, though I believe some kind of siliceous material is sold for the same purpose.—FILTRATION.

[3571].—Fire-brick Backs to Stoves.—What form is best to give to the backing? and should there not be a hollow space left between this backing and the back of grate? Which is considered the best stove for heating purposes out of the many patented, and which were described in the BUILDING NEWS some months ago?—FUEL ECONOMIST.

[3572].—Preservation of Timber.—Can any correspondent inform me whether any new patent has been taken out for preserving timber from decay? Is the pyrolygnite of iron process of impregnation carried out, and where?—STUDENT.

[3573].—Stone Pulpits.—Are there any examples of stone pulpits similar to that of Beaulieu, in Hants? I should like to be informed by one of your archaeological readers?—READER.

[3574].—School Board Regulations.—Have any recent instructions to architects been published? I should be obliged if any correspondent will inform me.—G.

### REPLIES.

[3530].—Hydraulics.—I trust "G. H. G." will excuse me observing that his reply at page 565 is certainly wrong, and I feel bound to fully endorse the reply given by "L." (who, so far as I am aware, is an entire stranger to me) at page 594. As to the reply by "E. W. T." page 594, the latter portion of it contradicts the first. In opening, he says: "The cause of the water not flowing into the lower cistern is the resistance or friction of the pipe;" but further on he observes, "the water at its exit would not rise more than 3in. above the orifice." Now, if the water in flowing through a pipe so large ("large" for a private supply pipe, or service pipe, although not so for a waste pipe, &c.) as 1½in. internal diameter comes with such force as to rush up 3in. higher than the orifice of the pipe, then it would very soon fill a pretty large cistern; and if the 1½in. pipe between "N. A. H.'s" cisterns were put in as shown by Fig. 2, page 566, then the water should flow freely between the two, supposing the 1½in. pipe were sixty-four yards in length, let alone merely the six-foot length. Only the greater the distance the slower the flow. In Fig. 2, page 566, it will be seen that one side of the upright pipe in the higher cistern is lower than the other. I often do this on purpose, considering it allows the water, while the cistern is filling, to flow freely down the one side of the pipe while the air comes up the other side. Another important point which I would call attention to is this, that supposing I admit with "E. W. T." that the water from the lower orifice of a pipe 1½in. in diameter internally, 64ft. long, and with 6ft. of pressure, would only rise up into the air 3in., yet I feel bound to add that if the outlet of this same 1½in. pipe be simply contracted to ½in. internal diameter, then the water will come out with such a force as to rise up into the air about 4ft. above the orifice. This latter assertion is no mere notion, as I have just verified it by experiment. I took a pipe ½in. in diameter internally (only ¼ the size of the above 1½in. pipe), and 50ft. long. I bent up one end 1ft. high, and the other end, (at which the water was poured in) I bent up 6ft. high. With the ½in. pipe fully open at its outlet—the 1ft. high end—the water, while coming out full bore, only rose up into the air about 3in. high; but when I contracted the orifice and inserted a short piece of ½in. gas pipe into it, then the water rushed up into the air more than 3ft. above the orifice. There are houses to my knowledge in Glasgow where the distance traversed by the pipe between the cistern and the water crane is above 120ft., and although the head of water is only 6ft., and the pipe in its whole course only ½in. internal diameter, yet the warm water flows out pretty freely for either a pantry sink or a washhand basin (the branch pipe to the latter especially is generally only ½in. diameter), although to my taste rather slow for a bath.—W. P. BUCHAN.

[3541].—Squints in Walls.—I think it probable the splayed openings here referred to were intended for the same purpose as the "squints" often noticed in the chancel wall and through the piers of the arch, viz., to enable persons in the transepts or aisles to see the high altar; in this case it may have been for the use of the attendant who rang the sanctus bell at the elevation of the Host. Instances occur in which the bell was placed on the porch or in a gable in the parapet, and these splayed apertures were doubtless to enable the ringer stationed in the room over the porch to see the elevation of the Host. There are similar examples to be met with, but we invariably find the direction of the splayed jambs is towards the altar from some point which may easily be determined by examination.—STUDENT.

[3541].—Squints in Arcades.—Mackenzie E. C. Walcott has mistaken my question in the number for November 15th. I asked if someone would explain their use. If he can do so I shall be much obliged; or to any one else.—E. P.

[3546].—Preserving Wood and Rendering it Uninflammable.—Dr. Jones's address is Harewood College, Tavistock, Devon. I believe a company is being formed for the purpose of purchasing and working Dr. Jones's patent, and I heard Mr. Bessemer's name mentioned as being one of the directors. Probably some other correspondent will be able to give more precise information on the subject, which cannot fail to be important and generally interesting to all engaged in the constructive sciences.—S. TREVAIL, Par, Cornwall.

[3547].—Calcareous Tufa.—It is a common opinion that the tufa used in the erection of churches and other old buildings came from abroad; but I think there can be no doubt that it is a native production, and was taken from the beds of streams where waters had percolated through calcareous rocks (in this neighbourhood, chalk and Kentish ragstone), and thus become impregnated with lime. I have found pieces in the streams hereabouts, but not of the size I have sometimes seen in buildings, notably in Birling Church, Kent, where there is a block measuring, I should think, 2ft. 6in. by 1ft. 6in., and perhaps 12in. in depth. Tufa is not quarried anywhere, to my knowledge, but probably might be dug from some of the streams I have spoken of.—HUBERT BENSTEAD, Maidstone.

[3548].—Interference with Lights.—I believe it is a rule that has been laid down in these cases, that no erection should exceed in height above the windows of any building, a limiting straight line drawn from the sill of such windows to the top of wall of the erection, such limiting straight line being at no greater angle to the horizon than 45deg. I think "F. S." can sustain compensation for an interference of the kind he mentions, as several similar cases of interference with old lights have been decided against the builders.—G. H. G.

[3548].—Interference with Lights.—No exact answer can be given without further particulars; the rule of the law is that, to entitle a person to relief in equity or damages at law, he must prove that he (or his predecessor) has enjoyed the light for at least twenty years uninterruptedly, and that the obstruction of the defendant will materially lessen the light, or has materially lessened it, and that the building will be or has been rendered less useful for the purpose for which it is and has been for twenty years used.—L.

[3549].—Circular Shaft upon Cylindrical Vault.—"Inquirer's" query is an important one. It appears to me cast-iron frames, as you have suggested, Mr. Editor, would meet the requirements best of all; or hard terra-cotta blocks might be made to form the square base of the shaft, so as to prevent the necessity of cutting the courses of the arch, which must be done under the common treatment. "Inquirer's" shaft is large, and therefore any plan adopted should be secure. In the transverse direction of the vault there is no difficulty; it is only in giving abutment for the courses intercepted by the shaft longitudinally; the gusset pieces between the square and the circle could, of course, be filled up afterwards. It seems to me the frame might be cast of an octagonal shape square at top, therefore projecting above the vault at its sides and following the curve of vault within, as you proposed.—ARCHITECT.

[3550].—Sewer Ventilation.—The plan of connecting sewers to boiler furnaces has been exploded by the majority of engineers, and separate and distinct means proposed. Shafts with gas jets is an old idea, but I do not think the same patent would cover.—ARCHITECT.

[3550].—Sewer Ventilation.—The idea of connecting sewers with boiler furnaces has been proposed on various occasions and in different ways, and I think the information would be obtained by looking over the back volumes of the BUILDING NEWS, in which the proposal has been made. I cannot state the date. Whether "Inquirer" can sustain a patent under such circumstances is doubtful. As to the second part of the question, I should say the patent would not cover the alternative plan, which is by no means new.—SANITARY.

[3551].—Measuring Plaster Work.—Take length of walls by their height, the latter being taken from top of skirting grounds to the ceiling. Make deduction for openings afterwards, and for half depth of cornices. For ceiling, which is generally first taken, take the superficial, deducting from both dimensions one width of cornice in each direction.—SURVEYOR.

[3551].—Measuring Plaster Work.—Measure the whole surface of plastering and then deduct windows and doors. Small windows some surveyors measure through, and with fairness.—G.

[3551].—Measuring Plaster Work.—The London method is to deduct window and door-openings, &c.—In fact, only to measure where the work actually is; but the wording of the heading of this question smacks of "ayont the Tweed," where the practice may be different. Methods of measurement also differ for labour and all materials and for "labour only." It may be that in some places for the latter that ordinary openings are not deducted to compensate for the extra labour they involve.—L.

[3553].—Dry Rot.—Corrosive sublimate, applied as a solution, 1oz. to a gallon of water, laid on while hot, is a good antidote. It is now known as Kyan's process. The timber is immersed in the solution in a

wooden tank, containing 1lb. of the sublimate to 10 gallons of water. A mixture of sulphate of copper and sulphuric acid in the proportion of 1lb. of each to 6 gallons of water, has been found to preserve timber. Sulphate of copper should first be dissolved in one gallon of boiling water, and the remainder of water and sulphuric acid added afterwards.—G. H. G.

[3555].—Improved Dwellings.—"G." is referred to the last week's number of BUILDING NEWS for some statistics on the matter he inquires about.—READER. [We hope to be able to supplement the above by further statistics soon.—ED.]

### STAINED GLASS.

BEAUCHAMPTON.—The east window of Beauchampton Church, Bucks, has been filled with stained glass in memory of the late Bishop of Winchester. The work has been executed by Messrs. Clayton and Bell, from designs by Mr. Street, R.A. Bishop Wilberforce is represented at the bottom of the window, kneeling, vested in a cope, the hands joined, the pastoral staff resting on his shoulder, and the mitre on the ground beside him.

PETERSFIELD.—Over the Norman chancel-arch of Petersfield Church two small single-light windows have been filled with stained glass, completing the restoration. The subjects are, in the one window "The Good Shepherd," and in the other "The Light of the World."

### STATUES, MEMORIALS, &c.

INVERARAY.—The Duchess of Argyll has just had a memorial bust of the late Dr. Guthrie placed within a medallion-shaped niche let into the front of the Free Church manse of Inveraray. The bust was executed by Mr. W. Brodie, R.S.A., Edinburgh.

PORTRAIT OF THE LATE OWEN JONES.—A portrait of the late Owen Jones has been exhibited for a few days at the South Kensington Museum, seemingly intended to be executed in mosaic, similarly to those already placed in the South Court of that building. The picture, according to the *Academy*, gives a profile likeness of the artist, satisfactorily correct, standing in an easy position and bearing under his arm a large portfolio. To avoid the awkward outlines of modern costume, a travelling plaid is thrown round the figure, and the whole has a sober tone which contrasts powerfully with the gold background. This may be intentional, as light colours do not suit in proximity with gold—witness the St. George of England, in the central lobby of the Houses of Parliament. The artist is Mr. F. W. Moody. The mosaic, surrounded by a well-designed Oriental enrichment, will be placed in the Indian Court, the ceiling of which was designed by Mr. Owen Jones.

### WATER SUPPLY AND SANITARY MATTERS.

LEWES.—At a special meeting of the Lewes sanitary authorities on Saturday, the Government inspector reported the result of his investigation into the recent outbreak of typhoid fever. In a lengthy address he minutely traced the epidemic. Twenty-seven persons had died out of the 450 attacked. The first cause was traced to water pollution during the dry season, when the company's supplies were unusually low. A recurrence of the calamity was rendered impossible by carrying out his instructions; constant service also was now given, and closet gases were prevented from escaping. Fresh cases were of a much milder type, and disease was being rapidly stamped out. He paid a high compliment to the town authorities for their ready co-operation during the investigation.

MACCLESFIELD.—Dr. G. Bland, the medical officer of health, has called the attention of the town council to the great importance of sewerage of the streets of the town which are at present either unsewered or imperfectly drained. Under the present system of sewerage, each additional street which is sewered pours into the Bollin an additional quantity of filth, so that the river will year by year become more and more polluted. He urges also the provision of means for isolating the infected sick, and also a disinfecting stove and public mortuary.

NEW WATER SCHEME FOR THE NORTH OF ENGLAND.—Application will be made to Parliament next session by a company calling itself the East Northumberland Water Company, to supply with water from the Rothbury district North Shields, Tyne-mouth, and the surrounding districts. The promoters propose to appropriate the rivers or streams, known as River Alwin, Rookland Sike, Puncerton Burn, Tosson Springs, Slatebrae Sike, Cowet Wells, Coe Burn, Cockpit Well, Routling Burn, Black Burn, Silburn, Whitton Burn, White Park Well and Pike Sike, being respectively tributaries of the River Coquet, and of the streams and waters which flow or proceed into or out of the same rivers and streams, and into, through, and out of the intended reservoirs and works and all or some of the streams and waters in the line of the proposed works or within the limits of deviation defined upon the plans.

THE SEWERAGE OF HUTTON AND ROBY.—The existing sanitary condition of these townships being very unsatisfactory, the Parochial Committee have instructed Mr. T. Mellard Reade, Civil Engineer, Canaling Chambers, Liverpool, to report to them as to the



scheme he should recommend for completely sewerage the district and disposing of the sewage, and as to the probable cost. The townships are of that mixed rural and suburban character, common in the vicinity of large towns, and it is desired to carry out a comprehensive system that will meet prospective wants for a generation to come. There is certainly urgent need of action in the matter.

#### LAND AND BUILDING SOCIETIES.

**HAWICK.**—On Saturday afternoon the Directors of the Working Men's Building and Investment Society offered to public competition among the members of the Society a number of houses which it is intended to erect on Hawick Glebe. The first lot offered was a block of twenty quarter-houses, to be erected in concrete. The houses on the ground-floor, which consist of two rooms, were offered at the upset price of £95, and brought from £109. 5s. to £101. Those on the upper floor, which have attics in addition to two rooms, were put up at £130, and brought £147. 5s. to £141. Four half concrete houses, containing double the extent of accommodation of the others, were offered at an upset of £300, and two were sold for that sum. Four quarter-houses of stone and lime, on upper floors, were offered at £190, and all sold at that price. The ground floor houses in the same block were offered at the upset of £135, and sold from £141 to £138. Thirty two houses in all were offered, and thirty sold. Attached to each house is a plot of garden ground.

#### LEGAL INTELLIGENCE.

**DISPUTE AS TO THE SALE OF LAND.**—The case of *France v. Carver* was brought before the Master of the Rolls, in the Court of Chancery, on Friday last. The plaintiff is an architect residing at Bradford; the defendant Carver is a carrier in Manchester, and two gentlemen named Ingle, also defendants, were manufacturers in Bradford. There was a certain piece of ground in the town situated between premises owned respectively by Carver and the Ingles, which it was understood would be offered for sale by public auction. Attempts were made to purchase the land so as to avoid all unnecessary excitement, and the plaintiff was employed by Carver to buy it as his agent. Before the sale took place it was found that the Ingles also wanted the land, and it was then decided that Carver should buy the lot, and then the final purchaser should be chosen by lot. There was a provision in this arrangement that the purchaser should, after the sale, name the price he was willing to pay; and if that was accepted by the other side, then the matter would be settled that way. The property, however, went for more than it was supposed; a dispute had taken place as to who should become owner, and in the end both parties refused to take the land; and the plaintiff filed a bill to make the defendants indemnify him. The Master of the Rolls said the plaintiff had made out his case, and was entitled to what he asked, and the costs would follow the general rule.

**LIABILITY OF THE BOARD OF WORKS TO PAY PARISH RATES.**—*STRATTON AND OTHERS V. THE METROPOLITAN BOARD OF WORKS.*—This matter was argued, in the Court of Common Pleas, upon a special case, the other day. The plaintiffs were the parish officers of St. Mary, Lambeth, and they claimed in all upwards of £6,000 for rates which had been lost to the parish during the construction of the Albert Embankment. The case turned upon a great number of details, and the amount recoverable, if any, was to depend upon the principle of liability which the Court should adopt. Mr. Justice Denman, in delivering judgment on Wednesday, said that the questions submitted to the Court were whether the defendants were liable to pay the deficiency, or any part thereof, in the poor's rate and land-tax under the Thames Embankment Acts; and, if so, whether the plaintiffs could legally enforce the arrears from 1865 to 1870 in a lump sum. One of the Acts said that the Board of Works should be liable to pay the deficiency of rating upon property taken by them, until the completion of the works. There had been a variety of arguments as to the meaning of this section, but the Court were of opinion that the meaning was that the Board should stand in the position of occupiers of the demolished houses, and pay what those persons would have paid if the Board had not taken the houses, and the amount payable by the Board was what the parish had lost upon these assessments down to the time when the works were completed. It had been argued that the Board was discharged from liability, as the deficiency was not demanded from time to time when the rates were made, because the ratepayers were a shifting body and could not now be indemnified; but the Court thought that the liability was not extinguished by delay, and that the demand down to May, 1870, could legally be made a lump sum. They also thought that the overseers of 1871-72 were entitled to enforce the payment. The amount payable by the Board would be the aggregate of the rates that would have been payable by the owners or occupiers if the property had not been taken; but they would be credited with the amount of rating upon new buildings erected upon the new sites. Judgment for the plaintiffs. No costs.

**PUBLIC PUMPS.**—Mr. Bridge, on Wednesday, at the Hammersmith Police-court, heard summonses with respect to three public pumps in Acton, the water in them being, it was alleged, polluted so as to be

injurious to health. The proceedings were taken by the Acton Local Board under the 50th section of the Sanitary Act passed last Session, wherein it gave power to a magistrate, in the case of water in a well being unfit to drink, to remedy the same. Mr. Hensley, clerk of the Board, said long before the Act was passed, notice was given that the water in the pumps was unfit to drink, but the people took it, and nothing was done. The pumps were used by persons living in the neighbourhood, and he had summoned certain owners of property interested in them. It appeared that the water had been analysed, and in two of the wells it was found contaminated with sewage, and in the other it was doubtful. Mr. Bridge thought that a public pump should not be closed until everything had been done to render the water fit to drink. He had the power to order a remedy, and he should like to have a suggestion made to enable him to render the water fit for use. Ultimately the summonses were adjourned for a fortnight, and Mr. Bridge gave instructions for water in two of the wells to be analysed by a gentleman he named.

**THE BIRMINGHAM SEWAGE THE ATTORNEY-GENERAL V. THE CORPORATION OF BIRMINGHAM.**—This was an application on Thursday week, before Sir J. Bacon, by the defendants to this suit, which is instituted at the relation of Sir Charles Adderley, in respect of a nuisance occasioned to him by the defendants draining into the River Tame. The defendants are under an injunction, but had obtained until the end of Trinity Term to obey it. They now moved, on affidavits showing that the effect of the injunction in stopping the drainage into the river was likely to be perilous to the health of the inhabitants of Birmingham, amongst whom fevers had already appeared to an alarming extent. The defendants, therefore, asked leave to open certain new sewers into the River Tame, and produced evidence to show that the processes which would be adopted would cause the discharge from the sewers to be deprived of all deleterious qualities.—Under these circumstances his Honour granted the defendants leave to construct the sewers above referred to.

**THE SUNDERLAND BUILDING BY-LAWS.**—At the Sunderland Police-court last week, Mr. Mark Howarth, builder, was fined 20s. and costs for violating By-law No. 20, by building an erection in the yard of the house, No. 3, Vane-terrace, Hendon, thus curtailing the amount of open space which the by-law requires should be left in the rear of each dwelling-house.—Mr. W. A. Oliver, on behalf of the defendant, applied for a case for the decision of a superior court on the point, as he held that the By-law was bad owing to its arbitrary and unreasonable character.—The Bench said they would take time to consider the application.—Mr. Howarth was further fined 5s. and costs for violating By-law No. 12, by building walls of an insufficient thickness; and a third summons for not sending in a plan until the building had been erected was withdrawn.

#### Our Office Table.

**NEW TRAP FOR DRAINS.**—Mr. Henry Matthews, a member of the Bristol Town Council, who has taken a deep interest in the questions relating to sewer gas, has invented and patented a balance-trap for the exclusion by mechanical means of sewer-gas from houses. Over the ordinary outlet of a sewer-trap is suspended a valve (working upon a spindle) in bearings starting in the shape of spurs from either side of the trap, but weighted so that it may close beyond a perpendicular line from its own axis; and being so placed as to secure the face of the valve against a suitable seat surrounding the outlet or orifice of the sewer or drain, against which seat the closing face of the valve will be retained by the weight of its projected horizontal part with or without gas pressure. The tendency of sewer-gas pressure will be to force the closing face of the valve tighter against its seat, effectually excluding sewer-gas from contact with the water in the trap. The valve opens upon water pressure from within, but only to such an extent as to afford a passage, and in proportion to the quantity, and immediately closes the moment such pressure is removed by the passage of such water. Whilst upon the sewer side of the valve, the greater the pressure of gas, the more securely is the valve fixed in its seat.

**MILITARY ARTISANS.**—It is affirmed by the special correspondent of the *Labour News* that a scheme is being discussed at the War Office which, if carried out in its entirety, will undoubtedly affect the artisans of this country. It seems that the Household troops, up to 1796, were employed at their several trades, and bricklayers, carpenters, masons, smiths, tailors, shoemakers, painters, glaziers, and other handicrafts, followed their occupations when off duty. Moreover, the London Guards had votes for the City of Westminster, and were marched up in companies to polling-booths to vote for King George. This

practice had been carried on from King Charles the Second up to Fox's time, when a breeches-maker, one Francis Place, of Charing Cross, with the support of Sir Francis Burdett, Fox, Sheridan, Grey, and the Prince Regent, contrived to get the soldiers disfranchised. How the artisans lost their work as well as their enforced votes, in the Guards, is not now clearly known. The scheme which the Deputy Inspector-General has drawn up is to promote the ancient idea. Now, some battalions of workmen from the Life and Foot Guards may cause some awkward interruption in the labour market. They can undersell, but they cannot attend regularly to their job; and it is rather curious how the Household Troops, in former times, could have performed their work—hours on and days off.

**INDUSTRIAL DWELLINGS.**—The Improved Industrial Dwellings Company recently offered premiums of £250 and £150 for the best designs for covering a large site in Goswell-road, on the Marquis of Northampton's estate. Twenty designs have been received, and Messrs. Charles Barry, George Godwin, and A. Waterhouse will assist the directors in arriving at a decision on the merits of each. The designs will, by permission of the Lord Mayor, who is one of the directors of the company, be exhibited at the Mansion House, in a room set apart for the purpose.

**OLD GIANT WALNUT TREES.**—Walnut trees sometimes attain prodigious size and great age. An Italian architect mentions having seen at St. Nicholas, in Lorraine, a single plank of the wood of the walnut 25ft. wide, upon which the Emperor, Frederic III., had given a sumptuous banquet. In the Baidar Valley, near Balaklava, in the Crimea, stands a walnut-tree at least 1,000 years old. It yields annually from 80,000 to 100,000 nuts, and belongs to five Tartar families, who share its produce equally.

**MAGIC INK.**—Messrs. Sampson Low and Co. have sent us some specimens of their new magic inkstands, from which ink of capital quality is readily obtained by simply pouring in cold water. The "Inexhaustible Magic Inkstand" is guaranteed to produce ink for every day for more than a hundred years. We cannot yet awhile, for obvious reasons, testify to the truth of this statement. All using the "magic" inkstands should be careful to follow the directions given to prevent the contents thickening. If this is attended to (and it is easily managed) no one using the inkstands can be dissatisfied with them.

**THROWN UNDER THE TABLE.**—A local paper has had the temerity to pass an opinion on the unsatisfactory condition of the Regent's Canal, and at the same time to fix the responsibility of such a state of things on the Sanitary Committee of the St. Pancras Vestry. The Vestry Committee accordingly entered on an investigation, and came to the conclusion that no action need be taken on the matter. The local journal before mentioned audaciously admitted into its columns a letter questioning the action of the Vestry Committee in the matter. This was too much for the committee, and at a recent meeting a resolution was carried to exclude reporters in future. A letter was read from the proprietor of the offending journal in which he declared he would not in future send a reporter, and therefore the vestry committee need pass no resolution excluding him. This letter it was duly resolved should be "thrown under the table," and the sentence was duly executed by the Chairman. That gentleman is, it is said, to be presented with his picture representing him in the act, and it is to be hung on the wall of the vestry-room as a record, for the benefit of future generations, that it was actually possible for a St. Pancras Vestry Committee, at the period commemorated, to surpass its previous history in making itself ridiculous, a fact which otherwise many might with reason have doubted.

**BUILDERS' BENEVOLENT INSTITUTION.**—A general meeting of this Institution was held at Willis's Rooms, St. James's, yesterday (Thursday), for the election of two pensioners on the funds, viz., one man and one woman, from the subjoined list of candidates. George Dines, Esq., President of the Institution, presided, and the poll opened at noon and closed at 3 p.m. The candidates were:—Evan Jones, 65, plasterer, &c. (second application); Robert Noyes, 76, plumber (second application); William Stribling, 71, carpenter and builder (first application); Thomas William Cranstone, 70, builder, &c. (first application); Sarah E. Bear, 63, widow of the late William



Bear, plasterer and builder (seventh application); Jane Rumens, 62, widow of the late J. Rumens, builder (fourth application); A. N. Williams, 62, widow of the late J. Williams, builder (fourth application); and Charlotte Day, 67, widow of R. P. Day, late pensioner on the funds of the Institution (first application). Shortly after the close of the poll the result was announced by the scrutineers to be as follows:—Jones, 328; Noyes, 471; Stribling, 314; Cranstone, 178; Bear, 2,783; Rumens, 4,243; Williams, 5,243; and Day, 402. The President therefore declared Robert Noyes and Mrs. A. N. Williams to be the successful candidates, and expressed the hope that at the next election, which will take place in May, 1875, a larger number of candidates will be eligible for election. Votes of thanks to the Chairman and to the scrutineers closed the proceedings.

## CHIPS.

Messrs. A. Steer and Co., the patentees and manufacturers of the Patent Grate for Economising Fuel and Utilising Heat, have removed from 83, Upper Thames-street, to more commodious premises at 118, Queen Victoria-street.

The celebrated Spanish painter, Fortuny, died at Rome on Saturday last, of typhoid fever, caught at Naples. He was 38 years of age.

A new block of buildings at Brompton Barracks, intended as married quarters for non-commissioned officers and sappers of the Royal Engineers, have just been completed.

A church is about to be erected at Farnham, in memory of the late Bishop Sumner.

New premises are being built at Dorking for the Hampshire Banking Company. Mr. William Shearburn is the contractor.

The Post-office authorities, consequent on the daily increasing demand on the space at their disposal at the Lombard-street branch office, are at present engaged in negotiations for the purchase of the site of the church of St. Mary Woolnoth, which adjoins their buildings.

A new Free Church was opened on Wednesday week at Willesborough, near Ashford. The material employed is chiefly Kentish rag, with Bath stone dressings. The apex of the roof is 48ft. from the floor, and it springs at a sharp angle from the side walls, which are 60ft. in length. The width is 36ft. The vestry is at the south-west corner of the building.

A great improvement has been effected in St. Mary's church, Dover, by the removal of the old organ gallery and screen at the west end, displaying the arch connecting the nave with the tower, and the Saxon arches at the lower end of the nave. A screen has been erected a little nearer the door. Two stained-glass windows are also to be inserted.

St. Luke's Church, Bilston, was reopened on Sunday last, after restoration.

The ancient cross of Tuam was erected on Wednesday week in the market-place of that town. The base of it has been for many years at the Roman Catholic cathedral, while the shafts and crucifix have been at the Protestant church.

A new Wesleyan chapel was opened on the 12th instant at Easton, Lincolnshire. The style is Early Geometric; the building will accommodate 300 adults and children. The whole of the works have been carried out by Messrs. W. Perkins and Sons, of Easton, from the design and under the superintendence of Mr. J. B. Corby, architect, Stamford.

The election of a new Royal Academician in the place of Mr. Foley, the sculptor, is to take place on the 9th December. No one seems to know whom the new man will be.

On Saturday afternoon four memorials-tones were laid at Southport, of a new Swedenborgian church. The style of the building is partially of Norman character, inclining in some details to Early English.

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Iron Doors and Safes;  
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## MEETINGS FOR THE ENSUING WEEK.

MONDAY.—ROYAL INSTITUTE OF BRITISH ARCHITECTS.—Discussion on Mr. T. H. Eagles's Essay on Vaulting. 8 p.m.

TUESDAY.—INSTITUTION OF CIVIL ENGINEERS.—(1). Discussion on "The Pennsylvania Railroad." (2). time permitting. "Aberdeen Breakwater." By Mr. W. Dyce Cay, M. Inst. C.E.; and "Kustendjic South Jetty." By Mr. G. L. Roff. 8 p.m.

WEDNESDAY.—SOCIETY OF ARTS.—On "The Expediency of Protection for Inventions." By F. J. Bramwell, Esq. F.R.S. 8 p.m.

FRIDAY.—ARCHITECTURAL ASSOCIATION.—"Periods of Transition in Architectural Style; and is the present day one?" By Mr. A. Payne. 7.30 p.m.

## Trade News.

## WAGES MOVEMENT.

LONDON.—A singular dispute between masters and men is now taking place in the plumbing trade in London. The men want to be at liberty to work overtime after dark, but the masters demur, mainly on the ground, according to the London correspondent of the *Scotsman*, that the metal used in the business has a strange knack of disappearing at night. The controversy, in fact, is growing warm and personal.

## The Timber Trade.

Wholesale prices for timber are at present as follows:—

	Per 120 12ft. 1½ by 11:	£ s.	£ s.
Archangel, 1st yellow	3 by 11	16 0	
" 2nd "	3 by 11	13 0	
" 3rd "	2 by 11	12 0	
Gefse 1 & 2 yellow	4 by 10	14 0	
" 3rd "	3 by 9	15 10	
" 3rd "	4 by 10	12 10	
" 3rd "	2 by 8	12 0	
" 3rd "	3 by 11	14 0	
" 4th "	4 by 11	12 10	
" 4th "	2 by 9	12 10	
Bjorneberg, 1 & 2 yellow	4 by 8	11 10	
" 3rd "	3 by 8	11 0	
Gothenburg, 3rd yellow	4 by 9	13 10	
" 3rd "	3 by 9	14 0	
" 2nd "	3 by 7	8 15	9 0
Onega, 1st "	3 by 11	16 0	
" 3rd "	3 by 9	16 0	
Sundswall 1 & 2 yellow	2½ by 7	11 5	
" 3rd "	4 by 7	10 5	
Skelleftea, 3rd "	3 by 9	12 0	
" 2½ by 7	2½ by 7	10 10	
" 4th "	3 by 9	11 10	
" 2½ by 7	2½ by 7	10 0	
Narva, crown white	3 by 9	11 0	
" 2nd "	3 by 11	10 0	
" 3rd "	3 by 11	9 0	
Gefse 1 & 2 white	3 by 9	10 10	
" 3rd "	3 by 8	9 10	
" 3rd "	3 by 7	9 0	
Abo, white		7 10	8 0
Helingsfors, 1 & 2 yel.	3 by 12	10 0	
" 3rd "	3 by 10	8 15	9 0
Kotka, 4th yellow	2½ by 7	10 5	10 10
" 1 & 2 "	3 by 10	10 15	11 0
Ljusne, 3rd "	3 by 9	14 10	
" 3rd "	3 by 11	14 0	
Jacobstadt, 3rd white	3 by 9	9 0	
" 3rd "	3 by 8	8 0	
Petersburg 1st yellow	3 by 7	14 0	14 5
" 2nd "	3 by 9	15 0	15 10
" 1st white	3 by 9	11 15	12 15
" 3rd "	3 by 11	11 0	
" 2nd "	3 by 9	10 0	
" 3rd "	3 by 11	10 0	
Uleaborg, 1st yellow	3 by 9	12 15	
" 2nd "	2½ by 7	11 15	
Holmstadt, 1 & 2 yellow	3 by 9	13 0	
" 3rd "	3 by 11	12 10	
" 2½ by 9	2½ by 9	12 10	
" 3rd "	3 by 9	12 0	
" 2½ by 9	2½ by 9	11 15	12 0
Holmsund, 1 & 2 yellow	4 by 9	14 10	
" 3rd "	3 by 8	12 10	
" 3rd "	4 by 9	13 10	
" 2 by 9	2 by 9	14 0	
" 3 by 8	3 by 8	12 10	
Husum, 1 & 2 yellow	4 by 9	14 10	
" 3rd "	3 by 8	12 10	
Miramichi pine		7 10	8 0
Pensacola pitch pine		12 10	
Swartwick, 3rd yellow	3 by 9	12 15	
Mesane, 1st yellow	3 by 9	16 0	
" 2nd "	3 by 9	13 0	
Norkoping, 3rd yellow	3 by 11	11 0	
Skelleftea, 3rd "	3 by 9	12 0	
" 4th "	3 by 9	11 0	
Stockaviken, 3rd "	3 by 10	13 0	
" 2 by 6	2 by 6	12 10	
" 4th "	3 by 10	12 5	
Wyburg, 1st yellow	3 by 9	13 10	
Wayra, 1st yellow	2½ by 7	13 10	
Christmestadt, white	3 by 9	9 0	
" 2½ by 7	2½ by 7	8 0	
Hernosand, 1 & 2 "	2½ by 7	9 10	
" 2½ by 6½	2½ by 6½	8 15	
Kaska, white	3 by 9	8 10	

Per load of 50 cubic feet.

	s. d.	s. d.
Dantzic oak plangons	70 0	
" best mid. fir	85 0	87 6
Pitch pine	75 0	77 6
Quebec oak	140 0	145 0
" ash	125 0	
St. John's birch	65 0	
Sundswall fir	50 0	55 0
Hudikwall fir	65 0	

Per 120, 12ft. 2½ by 6½.

	£ s.	£ s.
Dram, 1st yellow	9 10	
" 2nd "	9 0	9 5
" 3rd "	8 0	8 15
" 3rd white	7 10	7 15
Drontheim, 3rd yellow	7 10	
Laurvig, 3rd yellow	8 10	

Per 120, 12ft. 3 by 9.

	£ s.	£ s.
Ml ramiehl unsorted spruce	12 10	15 0
Pugwash spruce	13 0	14 0
Quebec, 1st spruce	17 10	19 0
" 2nd "	16 0	15 10
" 3rd "	12 10	14 0

Per cubic fathom.

	£ s.	£ s.
Riga lathwood	8 0	
Petersburg	8 15	9 15

## WHITLAND ABBEY GREEN SLATES.

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## TENDERS.

HIGH WYCOMBE, BUCKS.—For new cottage hospital. Mr. Arthur Vernon, architect.  
Spicer (accepted).....£1,320 0 0

LAMBETH.—For the erection of a new mortuary and dead house for Lambeth.

	£ s.	£ s.
Merritt and Street	£629 0 0	
Walton and Son	585 0 0	
Waterson and Co.	575 0 0	
Hunt	547 0 0	
Thompson	540 0 0	
Tyerman	525 0 0	
Cropper	517 0 0	
Dover and Sons	507 0 0	
Hutchins	496 0 0	
Cowland	495 0 0	
Basham and Varley	490 0 0	
Everidge	489 10 0	
Sawyer	489 0 0	
Nickson and Son	481 0 0	
Mason and Brisly	477 0 0	
Nightingale	473 0 0	
Smith	470 0 0	
Cullam	466 0 0	
Gammon	440 0 0	
Reid	430 0 0	
Wear (accepted)	425 0 0	

LONDON.—For repairs and painting to premises 45, 46, 47, Cornhill. Mr. E. A. Gruning, architect.

	£ s.	£ s.
Beeton	£89 10 0	
Heeps	60 0 0	
Lidstone (accepted)	57 18 0	

LONDON.—For alterations and repairs to the "Victory" public-house, Newham-street, Edgware-road, for Mrs. Copus. Mr. H. J. Newton, architect.

	Repairs.	Alterations.	Total.
Ebbs and Sons	£189	£150	£339
Brown	170	145	315
Thompson & Smith	171	140	311
Taylor	160	131	291
Hockley	150	120	270
Shurmer (accepted)	135	127	262

LONDON.—For additions and repairs to premises in Tenter-street, Whitechapel, for Mr. L. Silberberg. Mr. C. Reilly, architect.

	£ s.	£ s.
Turner and Sons	£1,312 0 0	
Heeps	1,295 0 0	
Newman and Mann	1,256 0 0	
Kiddle and Son (accepted)	1,067 0 0	

LONDON.—For alterations and repairs to Nos. 5 and 6, Hart-street, Mark-lane. Mr. James Harrison, architect.

	Quantities supplied by Mr. H. J. Gordon.
Little	£1,279 0 0
Sewell and Sons	1,124 0 0
Ennor	1,060 9 0
Browne and Robinson	1,053 0 0
King and Son	1,020 0 0
Hobson	995 0 0
Merritt and Ashby	973 0 0
Thomas	894 0 0

LONDON.—For the erection of buildings, Norton Folgate. Mr. C. Fowler, architect. Quantities by Mr. Lovegrove.

	£ s.	£ s.
Wall Bros.	£1,997 0 0	
Crabb	1,950 0 0	
Baugs	1,874 0 0	

LONDON.—For first section of Mount St. Marie's College Kiburn for the Rev. Father Cooke, O.M.I. Mr. E. Welby Pugin, architect. Quantities supplied by Mr. W. R. O. Hart.

	£ s.	£ s.
Lascelles	£2,150 0 0	
Merritt and Ashby	2,080 0 0	
Home	1,980 0 0	
Watson	1,910 0 0	

NORFOLK.—For the erection of teacher's residence, school, and classroom, to accommodate 82 children, for the Broome School Board. Messrs. N. Pells and Son, surveyors, Beccles.

	£ s.	£ s.
Elden and Hides	£925 0 0	
Botright	911 10 0	

RAMSGATE.—For sewerage works for the Ramsgate Local Board.

	£ s.	£ s.
Home (accepted)	£248 10 0	

SUFFOLK.—For the erection of school and classroom at Blythburgh, to accommodate 112 children. Messrs. N. Pells and Son, surveyors, Beccles.

	£ s.	£ s.
Marsden	£615 0 0	
Surveyor's estimate	590 4 0	



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#### COMPETITIONS OPEN.

**KENDAL URBAN SANITARY AUTHORITY, Dec. 15.**—For  
laying out an estate of about 9 acres at Watsfield. Pre-  
miums of £10 for the 1st, and £5 for the 2nd best design.  
Mr. J. Banks, Boro Surveyor, 100, Highgate, Kendal.  
**PAISLEY, Feb. 1.**—For designs with specifications and  
estimates for the erection of a Town Hall. Premiums of  
£100 for the 1st, £50 for the 2nd, and 25 for the 3rd best  
design. Town Clerk, Council Chambers, Paisley.  
**ROCHESTER, Dec. 5.**—For designs for houses proposed  
to be built on the City Garden Estate. Premiums of £30  
for the best, £20 for the second, and £10 for the third  
best designs. R. Prall, Town Clerk, Town Clerk's Offices  
Rochester.

**Geometrical and Encaustic Tile Pavements**  
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C. WEBB, Tiles, Worcester.** London House, 114, Victoria-street,  
Westminster. Mr. T. Pulling, Agent.—[ADVT.]

#### CONTRACTS OPEN FOR BUILDING ESTIMATES.

**BOARD OF WORKS, FULHAM DISTRICT, Dec. 2.**—For  
making up the roadway, and kerbing and paving the  
footways in Ravenscourt Park-road. Surveyor's Office,  
Broadway, Hammersmith.  
**BRIDLINGTON QUAY, Dec. 5.**—For the erection of a  
Masonic Lodge. William Bakewell, architect, 12, East  
Parade, Leeds.  
**BURLEY-IN-WHARFEDALE, Nov. 30.**—For the erection  
of a pair of semi-detached villas. Messrs. Hope and Jar-  
dine, architects, Exchange-buildings, Bradford.  
**CARDIFF Nov. 30.**—For the enlargement of the County  
gaol. Messrs. Martin and Chamberlain, Christchurch-  
buildings, Birmingham.  
**CHERTON SCHOOL BOARD, Dec. 7.**—For the erection  
of a school for eighty children, with teacher's residence,  
&c., at Cherton, near Alresford. Hr. W. Hart, architect  
Alresford.  
**CLIFTON UNION RURAL SANITARY AUTHORITY, Dec. 3.**  
—For supplying and laying about 44,786ft. of stoneware  
pipe sewers, with manholes, ventilators, &c. F. Rawle,  
Clerk's Office, Fishponds-road, Clifton.  
**DARLINGTON, Dec. 2.**—For the erection of new malt-  
kilns in Neasham-lane. Messrs. Ross and Lamb, archi-  
tects, Peethams, Darlington.  
**DUNDEE, Nov. 30.**—For the construction and erection  
of the ironwork for waterworks at Clatto. Messrs. Leslie,  
72A, George-street, Edinburgh.  
**HASTINGS, Nov. 30.**—For the erection of a Wesleyan  
Chapel. Mr. W. W. Pocock, architect, 35, Craven-street,  
Strand.  
**HAY, BRECONSHIRE, Dec. 12.**—For the erection of a  
police station and constables residence, with magistrate's  
room. Mr. D. Thomas, Clerk of the Peace, Hay.  
**HUDDERSFIELD, Dec. 8.**—For the erection of a Baptist  
Chapel in New North-road. Mr. T. W. Helliwell, archi-  
tect, Brighouse, Huddersfield.  
**ISLE OF WIGHT, Dec. 16.**—For the erection of a new  
church at Gatten. Mr. C. L. Luck, Carlton chambers, 12,  
Regent-street, S.W.  
**LEEDS, Dec. 5.**—For the erection of a warehouse in  
Gascogne's Yard, Boar-lane. William Bakewell, archi-  
tect, 12, East Parade, Leeds.  
**LEEDS, Dec. 2.**—For the erection of the Leeds Church  
middle class schools in Vernon-road. Mr. C. R. Chorley,  
architect, Leeds.  
**LONDON AND ST. CATHERINE'S DOCKS CO., Dec. 9.**—For  
supplying and fixing 14 hard wood mooring bollards, 4  
wrought-iron mooring screws; also for supplying and  
erecting a corrugated iron lean-to roof. Mr. R. Carr,  
Engineer, London Dock.  
**MANNINGHAM, Dec. 3.**—For the erection of four pairs of  
semi-detached villas, and seven terrace houses in Toller-  
lane. Messrs. Milnes and France, architects, Cheapside,  
Bradford.  
**MENTON, Nov. 30.**—For the erection of a residence and  
farm buildings. Mr. Wood, Menton Villa, Menton.  
**MIDLAND RAILWAY, Dec. 1.**—For 65,000 yards excava-  
tion run to embankment. Engineer's Office, Derby.  
**MIDLAND RAILWAY, Dec. 1.**—For the erection of engine  
painting, and stores-shed at Derby. Engineer's Offices  
Derby.  
**POLEGATE, SUSSEX, Dec. 1.**—For the erection of a  
church. R. K. Blessley, architect, Eastbourne.  
**SOUTH METROPOLITAN SCHOOL DISTRICT, Dec. 21.**—  
For paving the girls' playground at the school at Sutton  
with either 2½in. York stone, asphalt, wood, or tar-pav-  
ing. J. Burgess, Clerk, Sutton, Surrey.  
**STAFFORD, Dec. 1.**—For the erection of a public hall.  
Mr. H. Ward, architect Bank-passage, Stafford.  
**STOB HILL, Dec. 9.**—For the erection of new boys  
school, and additions and alterations to girls' and infants'  
school. Mr. B. Stoddart, Clerk to the School Board, Gore-  
bridge.  
**SWANSEA, GLAMORGAN, Nov. 30.**—For the enlargement  
of the House of Correction. Messrs. Martini and Cham-  
berlain, Christchurch-buildings, Birmingham.  
**WORKINGHAM, Dec. 14.**—For the rebuilding of the branch  
of the Stourbridge and Kidderminster Banking Co. Mr.  
H. L. Florence, architect, 3, Verulam-buildings, Grays  
Inn, W.C.

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—[ADVT.]

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Cremation and Burial  
Arthur Woolf, the Cornish Engineer  
On Extending the Compass and Increasing the Tension of Stringed In-  
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As manufactured at the Company's Works, Burham, on the banks of  
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Bricks, Tiles, &c., of all design made to order.  
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## THE BUILDING NEWS.

LONDON, FRIDAY, DECEMBER 4, 1874.

## WATER.

IT is not proposed in the present article to discuss the various qualities of water, whether for drinking or other purposes, but rather to consider the mechanical properties of liquids as distinguished from those of solids and gases. These properties are usually classed under two distinct heads, namely, *hydrostatics*, when the liquids are at rest and in equilibrium, *hydraulics* or *hydrodynamics*, when they are in motion—a knowledge of both of which is of great importance to the architect and engineer, in the storage of water in tanks, the supply of it to houses, and many other mechanical uses to which water is applied. Water is an inelastic or incompressible fluid, that is to say, the space it occupies cannot be reduced by the pressure of a very great weight, in which it is the opposite of gases or elastic fluids, and also of solids, both of which can be compressed to an almost unlimited extent. This incompressibility renders water very useful for transmitting pressure instantaneously when inclosed in a vessel or pipe, as in the hydraulic lift and Bramah's press, to which we shall hereafter refer. When water is inclosed in a vessel it seems urged by its very nature to try and find some means of escape from its confinement, and soon discovers the slightest crack or weak place, so as to burst the vessel if not of sufficient strength to resist the pressure. Fortunately, however, it is easy to calculate the exact amount of pressure exerted by water on the sides and bottom of a tank or reservoir, in which large quantities are stored, so as to provide against accidents arising from this tendency to escape. The pressure on the bottom is quite independent of the shape of the vessel, and is the same whether the sides incline inwards or outwards, or are quite vertical, depending entirely on the height of the surface of the water above the bottom, and being equal to the weight of a column of water whose base is the area of the bottom and whose height is the depth of the water; so that in a conical or pyramidal vessel of which the sides lean inwards, this pressure exceeds the actual weight of the water contained. Where the bottom of the vessel or tank is not level, the depth of its centre of gravity below the surface must be taken as the height of the column of water, which rule also applies to finding the pressure on the sides, so that the pressure on each of the sides of a cubical vessel full of water is half that on the base.

When water is contained in a tank the resultant of all the pressures on any side does not pass through the centre of gravity of that side, but through a point below it, being one-third of the height from the bottom in a rectangular vessel full of water; this point is called the *centre of pressure*.

If the vessel or tank has sides sloping outwards, the centre of gravity is higher than in a rectangular vessel, being  $\frac{3}{8}$ ths of the height from the bottom when the length of the top of a side is double that of the bottom. Tie-rods or buttresses have to be used to prevent the sides of large tanks from being burst out, and these must be placed at the centre of pressure of each side in order to produce their full effect, and not, as is often done, fixed to the top or some other part of the vessel.

If two vessels of equal or unequal diameter are made to communicate by a pipe at the bottom of each, water poured into one will rise to the same height in both; so that if one vessel is much less than the other, a small quantity of water in it will balance a large quantity in the other. If a piston is fitted in the top of the larger vessel and loaded with a

weight, water poured into the smaller vessel will raise the piston and its load, the pressure on the under side of the piston being equal to that of a column of water having the area of the piston for its base, and the height that of the water in the smaller vessel above the bottom of the piston; so that a very great weight may be balanced or raised by a very small quantity of water, since the pressure upwards on the piston is the same, whatever may be the size of the smaller vessel. In this way the water in a pipe is made to raise a great load placed on a piston working in a cylinder, as in the hydraulic lift; the larger the piston and cylinder are in diameter, the greater the weight that can be sustained. When a pipe is brought down from a cistern at the top of a house to a close boiler in the basement, the pressure exerted by the water in the pipe on the surface of the boiler will depend entirely on the height of the cistern above it; if this is 32ft., the pressure will be 15lb. on every square inch; and when it is 64ft. the pressure will be 30lb. on every square inch, quite independently of the size of the pipe, and no diminution of pressure is obtained by making the pipe smaller at bottom than at the top.

When a foundation wall is sunk into the earth, we know that it presses on the bottom with its full weight; but when built in water it loses a weight equal to its own bulk of water by the upward pressure being equal to the weight of fluid displaced; so that a pier of which the material weighs 125lb. per cubic foot in air, loses just half its weight when placed in water as far as the surface of the water extends, since the weight of a cubic foot of water is  $62\frac{1}{2}$ lb.; consequently the structure will press with so much less force on the bottom, and will have its power of resisting a horizontal thrust diminished proportionally. When a foundation is formed of timber piles driven into the bed of a river, the water will exert a considerable upward force, tending to draw them out, and a sufficient load must be placed upon them to counteract this action, it having often happened that the piles driven in to form a dam in deep water have been lifted out when not driven to a sufficient depth in the bottom, or if the nature of the earth is such as to give very little hold on the piles. For instance, let us suppose a pile 12in. square to have a length of 20ft. immersed in the water, there will be an upward pressure of 20 times  $62\frac{1}{2}$ , or 1,250lb. tending to lift the timber out of its place, which has to be counterbalanced by the friction of the soil into which it is driven, and the weight of the pile itself.

When water has to be raised from a lower level to a higher one it is necessary to employ a machine of some sort to effect the purpose, the simplest of which is the suction-pump, consisting of a cylinder in which a piston is worked, the raising of the piston producing a vacuum into which the water is driven by the pressure of the air on its surface. As, however, this pressure will only balance a column of water 32ft. high, if the water has to be raised to a greater altitude resort must be had to the force-pump, which is placed near the surface of the water to be raised, and the water is forced to any required level above it; the quantity raised in any time depends on the diameter of the pump, the length of the stroke, and the number of strokes per minute. A pump 2in. diameter, having a 9in. stroke, will deliver one gallon for every 10 strokes, and a 3in. pump more than double that quantity; as, however, there is more friction in small than large pipes, it is necessary that they should be made of sufficient size so as not to hinder the flow of the water, and never less than half the diameter of the pump itself. When it is required to keep up a continuous stream from a force-pump, as in the case of a fire-engine, an air-vessel is fitted to it, into which the water is driven, and compresses the air, which, by its elasticity, causes the water to issue in a regular stream.

In no instance is the power of a small quantity of water displayed so much as in Bramah's press, which consists of a strong cylinder fitted with a piston, on the top of which the weight to be lifted is placed; a pipe from this cylinder leads to a smaller one, in which a piston or plunger is worked by means of a lever; as this plunger is raised, it draws up water from a cistern; and, on being lowered, forces that water into the larger cylinder; and, as the water, from its inelasticity, cannot be made to take up a smaller space, the piston must rise to make way for it, and the greater the diameter of the larger cylinder, as compared with the smaller, the heavier the weight that it will raise. By this machine, the heaviest weights can be lifted, there being hardly any limit to the force that can be thus developed when rapidity of motion is not required, provided that all the joints can be rendered sufficiently tight to prevent escape of the water.

When water is conveyed from one tank or reservoir to another, by means of a long pipe, there is a certain amount of resistance offered to it by the surface of the pipe; this resistance is proportional to the surface of the pipe, and will, therefore, be greater for a small than a large pipe; it is also very nearly proportional to the square of the velocity at which the water is moving. The retardation caused by this resistance prevents water from rising to the same height again after passing through a long pipe, and occasions what is termed a *loss of head*, the head of water being the height of the surface of the reservoirs above the orifice of discharge at the lower end of the pipe. To find the velocity of discharge from a pipe, multiply the head by the diameter of the pipe, and divide by its length (all in feet); then multiply the square root of this quantity by the constant number 50, and the result is the velocity in feet per second; if this velocity is multiplied by the area of section of the pipe (also in feet), we obtain the number of cubic feet discharged in a second of time; and this multiplied by  $6\frac{1}{4}$ , gives the number of gallons. For example, if the head is 32ft., the diameter of the pipe  $\frac{1}{2}$ ft., and its length 100ft., the velocity of discharge will be 20ft. per second, and the area of section being  $\frac{1}{16}$ th of a foot, the discharge will be 4 cubic feet, or 25 gallons per second. We have here supposed the pipe to be quite straight without curves or bends, but as these are usually of frequent occurrence in pipes of considerable length, a much greater amount of retardation takes place, and the velocity of discharge decreased thereby. If the change of direction of a pipe is made with a sharp elbow, the retardation is much greater than with a rounded turn; when the angle of deviation is 40deg., with a sharp elbow the loss of head due to the turn is one-seventh of the head of water due to the velocity at that point. For an angle of 60deg. the loss is rather more than one-third; and for 90deg. the loss is nearly equal to the head itself, or the water is momentarily brought nearly to a standstill. In general, however, the change of direction is made with a circular bend, and the larger the radius of the bend the less the resistance caused by it; thus, if the radius of the bend is five times that of the pipe, the loss of head in a deviation of 40deg. is only 1-32nd; where the angle is 60deg. it is 1-21st; and for 90deg. it is 1-14th. If the radius of the curve is twice that of the pipe, the loss of head will be rather more than double that of the first case; and where the two radii are the same, the loss is fourteen times as great, the curvature of the bend being measured along the axis of the pipe. We can thus find the diminution of velocity arising from any bends in a pipe, since the square of the velocity in feet per second at any point is equal to 64 times the height of head in feet. The velocity of water in a pipe is also diminished by any abrupt widening, being inversely as the section, so that the discharge will not be increased by enlarge-



ment of the pipe. When water flows out of a small orifice in the bottom of a vessel the velocity of issue is that due to the height of the water in the tank, provided that remains always at the same level, and it is found in feet per second by multiplying the square root of the height by 8. The stream, however, as it leaves the vessel suffers contraction, so that the actual area of the discharge is only 5-8ths that of the opening. When there is a variable head of water, the velocity of issue varies as the square root of its height, and the time of emptying a cistern by an orifice at the bottom is double that of discharging the same quantity of water from the same orifice when the cistern is kept full.

#### FRENCH ENGINEERING IN THE EAST.

N EARLY thirty years ago a number of French engineers persuaded the ruling prince of Egypt that he might bestow inestimable benefits upon the country, besides creating for himself an imperishable renown, by undertaking to construct a barrage, or dyke of prodigious dimensions, in combination with a system of canals, which should reclaim from sand and salt marsh the richest of the Egyptian lands that had lain uncultivated for centuries. The history of this project, now that it has been illustrated by the recent inundations, and now that, according to the last authentic intelligence, it has come to a close, through the works having proved useless in a double sense, is worth remembering. They were intended to provide water where there was none, and to regulate its overflow when there was too much; and they accomplished neither purpose. The able, but imperious Pasha Mohammed Ali, infatuated by some professional men from Paris, conceived the idea of superseding all natural and traditional provisions or artifices for the irrigation of the soil by erecting a stupendous dam, connected with a labyrinth of channels, which should at once restrain and distribute the annual flood. To this end he almost stopped the navigation, paraded his plans on Parisian maps, set an array of half-starved peasants to labour upon mounds of earth and aqueducts of masonry, and expended upon engines and engineers, both French, an incalculable amount of money. The promoters took a pride in attributing so grand a scheme to the First Napoleon; but a quarter of a century after the Barrage of Mohammed Ali was begun, it was in the same condition as another, constructed six hundred years before, which the Nile, at its first extraordinary rise, overthrew. It is well known that the Nile, approaching the sea, divides into two branches—the Damietta and the Rosetta. It was here that the projectors thought to store up the waters which had come down from the upper regions, by throwing dams across both channels; yet, after an incredible waste of toil and treasure, their work remains a ruin, never to be repaired. No doubt its originators had an amount of reason in their hope, which was, however, too daring for fulfilment through any means at their command, though a generation which has witnessed the completion of the Mont Cenis tunnel and the Suez Canal might possibly not shrink from reviving this ambitious scheme were it founded on a more practical basis. For, as it has been plainly described by the French engineers, the object was to hold up the waters of the Nile, during the eight months of ebb, so as to maintain them at the level of the soil and supply Lower Egypt during that period with the same amount of water as the period of the yearly inundation, it being estimated that the enormous expense of the work itself and the new system of canalisation it would necessitate would be more than compensated for by a vast increase of cultivable land in the Delta, or space between the two arms of the Nile, and the setting free of innumerable hands from raising water for purposes of tillage.

The conception was worthy, perhaps, of old Egypt; unhappily, the attempt at its execution, since the first stone was laid by Mohammed Ali in 1847, has been incommensurate. The foundations of a double bridge were raised, spanning the ample stream, with its deep, soft, muddy, and changeable bed—an experiment such as that of damming the Thames at Greenwich, with a full tide running and no bottom to hold by. The engineers got on famously at first; they threw up a series of light and lofty arches; they created an imposing architectural façade, turreted with admirable effect above each of the sluice-gates, and towered in the centre and at the corners. Nothing could be more majestic than the general aspect of the Barrage as it promised to approach completion, and nothing more apparently practical than the apparatus of sluices, with their double cones of hollow iron, working, as Dr. Russell says, on radii of rods fixed to a central axis on each side of the gate. These cones increased in dimensions from the bottom to the top, the lower filling with water as they descended into their beds of masonry. It was never proposed to keep them shut all at one time, because the pressure of the Nile, rolling from its remote fountains, would in that case have probably swept the entire elaboration away; but even then it was found that these ramparts raised against nature vainly struggled with it. The locks, with their terraced quays, speedily exhibited signs of dislodgment from their sites; the archways burst; the canalways were gorged; the neighbouring dams of earth availed nothing; and what is left of the Barrage at this day attests a colossal scientific failure, the results, such as they continue to be, proving mischievous rather than beneficial to the country, not one shilling having been returned to the Viceroyal treasury of the millions upon millions sterling that were sunk. It was so formerly in India, where a French engineer was not less essential at every native court than a French colonel of cavalry. This is said without disparaging in the slightest degree the science of France; it points rather to the pseudo-science of adventurers, half political and half financial—for nothing could be more absurd than any depreciation of foreign engineers in these respects. A peculiar genius, however, belongs to every nation, consequent, in a great measure, upon the necessities which create habits. Thus neither the English nor the French have any monuments to display equal, or even similar, to the sea-dykes of West Cappel, the Helder, and the Isle of Walcheren, in Holland; they do not require them, though the requirements of coast-railways are often formidable enough. And yet the great dam of the river Fureus, St. Etienne, France, is a trophy of enterprise and skill, though not upon any gigantic scale; it secures an immense body of water in permanent reservoirs; it guards against all danger of overflow; it has needed scarcely any reparation during the last twelve years; and it has withstood the shock of a waterspout historically calamitous. There is a barrage, too, in Spain, fifty yards high, and two hundred years old, but curvilinear in form, whereas all the French barrages are straight; but both differ in many essential particulars from the Egyptian, in which more masonry is employed, more sluices are capable of being opened, and an artificial foundation was sought, though never found. The engineers at Fureus had a rock to build upon; those of the Nilotic Delta never found their way, properly speaking, through the quicksands or the mud. Little wonder, then, that the last vestiges of their labours are vanishing. Mr. Aymard, in his book on Irrigation in Spain, gives a history of the barrage at Puentes, which cost an astonishing sum, and which gave way at the base in 1802, the architect having conceived the notion of founding it upon piles in an alluvial soil, instead of going down to the solid rock at any sacrifice. Remarks of a similar

kind have been applied by the highest authorities to most of the dykes of this complex kind, composed of bridge, dam, and tunnel at once, in Europe, and they apply with tenfold force to the magnificent "Folly" of Mohammed Ali and his Parisian Engineers in Egypt. As a last resource, the reigning Viceroy and his predecessor thought it practicable to recover from the ruins of the French Barrage some aids towards the construction of a new one by English engineers; but the advice given them, and to the former especially since the late disastrous inundations, has been to get rid of the obstruction altogether. Nothing less than the dimensions and solidity of a breakwater would curb, in redundant seasons, the fall and flow of the Nile, carrying with it, as it does, the impetus of thousands of miles, gathered from elevated sources, and only moderately diminished in its progress through the lakes and down the endless valley. Even in constructing the Suez Canal, the French engineers discovered many difficulties and perils upon which they had not originally calculated, and peculiarly so in the case of the necessary embankments; but what was the scientifically-arranged meeting of two seas in comparison with the perpetual down-pour of a river so fluctuating, and yet so voluminous and incessant as the Nile? It was not as a protection against the waves and winds of the Mediterranean alone that the Cyclopean breakwater of Alexandria was designed, but also against the turmoil of the waters caused by the irregular rushing of the great Egyptian stream. As an illustration of the meaning implied, reference may be made to some vast works undertaken, not long ago, on the Danube. In the recommendation report, it was suggested that the current should be, in some measure, controlled; but the ultimate decision was to smooth the bed, to set the water free by all possible expedients, to deepen and straighten instead of curbing or diverting; and this is the lesson which, after the life of a generation, has been learned in Egypt. The barrage of the Nile, with all its complications of dykes, viaducts, sluice-gates, tunnels, canals, and pumps, was far from being pronounced complete when it became a ruin, and a ruin it will remain until the last traces of M. Linant's ill-judged undertaking have been either swept away by other floods or overwhelmed by the sands. It is, and was from the commencement, to be feared that the work was urged upon the successive rulers of Egypt from political motives rather than from any real belief in its feasibility; but the reminiscence is an unpleasant one of the extorted toil, no less than of the extorted taxes, wrung from a poor and helpless population to aid in this realisation of a dream indulged in by a Franco-Egyptian Society which once actually proposed the drainage of the Lake Mœris, as though Egypt were Holland, unduly invaded by the billows. Of course a philanthropic incentive may have prompted some among the engineers who pressed their services upon the Pasha Mohammed Ali and his equally credulous successors. It would have been a great advantage, no doubt, if the immense amount of manual labour now devoted to raising dribbles of water from the river by rude appliances of primæval fashion, which have exhibited no improvement for centuries past, could have been saved, and this, indeed, was among the objects proposed to be fulfilled by M. Linant's unfortunate Barrage; but the same end could have been obtained, at a hundredth of the cost, by another process, as was demonstrated at the very time when these leviathan plans were being drawn, by an Egyptian prince of a different mould (Ibrahim Pasha), who established stationary steam-engines on his estates, which increased in fertility and value while the dykes, and the arches, and the canals, were in progress, with a view ultimately to foster harvests on the waste lands of the valley, though in reality



to bequeath fresh evidence—as if any were needed—of the truth that an idea may be theoretically grand and practically worthless. These Pharaonic works neither interested nor enlightened the poor peasants on whose behalf they were said to be undertaken. They simply served the purpose of a few speculators, and their destiny has culminated in a general swamping and downfall. Henceforth the latest trophies of the modern Pharaohs will present to the traveller's eye a few groups of unpicturesque fragments, scarcely coherent enough to tell the tale of their original design.

#### LONDON & PROVINCIAL PRACTICE.—II.

ONE of the most remarkable distinctions of country practice is to be found in the amphibious character of its professors. We have already alluded to the general attainments of the country practitioner. Sometimes, however, we find him quite an omnigenous individual. He is everything *de omnibus rebus*, from an architect or engineer to a commission agent of sundry kinds. He is ready to go in for the new Town-Hall or Country Church, the town sewerage, or the sanitary inspectorship. Besides usual surveyor's work, he often undertakes to get out "builders' quantities," adjust disputed accounts, and do a variety of *infra dig.* work to fill up his time. There is always a good sprinkling of omnifarious busy-bodies in all professions; but, in the country especially, the architectural profession appears particularly gifted with this sort of factotum. In many places he becomes an influential man in his way; his acquaintance is large among the town's tradesmen, and he generally has an amount of confidence and braggadocio that carries him along, and occasionally makes him the foremost practitioner in his way. Such a *mélange* of qualities could not exist in London nor in large towns; it is a kind of *genus homo* which thrives best in small country towns, where the influence of localism is felt, and where party interests largely predominate. It is a product of provincialism, however, that seriously affects the *bonâ-fide* architect or surveyor. A man's abilities are never adequately valued in the country. He is surrounded by a few patrons who appreciate his ability, but by a far larger class of the public who do not understand his profession, nor value his performances at their real value. His art is a luxury or a speciality not sought after; there is no demand for him except on special occasions; and therefore the more general demand is supplied by a more ordinary class of ability. It is the same in trade as in mental occupation. In the provinces the supply must be general, not special; a provision for classes is not so much needed as provision for the unappreciative mass. This condition operates very unfavourably upon the qualified professor, who feels, not without some justice, that Mr. Charlatan, who has lately sprung into popularity, is not a properly qualified individual—is only a braggadocio, whose only merit is his loquacity or his pushing qualities. We know not a few provincial men who have suffered unduly from this cause, and whose only sin has been their shyness or retiring qualities. Where, we may ask, would many of our leading men have been, had they not, by some lucky hit or circumstance, been pushed to the front? Their capabilities would have been comparatively lost to the world and their profession. To contest a small locality with a fair share of brains and ability is a hopeless task when the field is without culture or discriminative patrons. Sycophancy is too frequently the pestiferous influence against which the genuine practitioner has to fight, and nowhere more than in small country towns do we find obsequiousness so rewarded. This habit is often carried to extremes. A whisper is on the wing that a certain local big-wig is about to build, and immediately a host of sycophants are to be found ready to pre-

pare designs on approval; the machinery of local interest and party influence is put in motion and brought to bear, and Mr. Bounce succeeds in winning a promise of employment, at, perhaps, very unprofessional terms, both morally and pecuniarily. This is no uncommon proceeding, and we have not drawn the picture at all exaggeratedly. Competition has not been the corrective it should, but it has in some few instances mitigated the undiscerning fiat of local favour or stupidity. An architect is not estimated by the skill in art-power he has; he is, unlike his professional brethren the medical and legal practitioners, whose skill is measured by the decrees of absolute knowledge. The medicus and the legal professor submit their abilities to tribunals beyond the control of ignorant pretension; both are adjudged by actual facts—by natural laws, or the laws of the realm, administered by learned agents; but the architect's success or ability must be adjudged by the arbitrary dicta of individuals biased by prejudice or blinded by interest. The consequence is that the wider his scope becomes, the more numerous his patrons are, the more chance has he of making his power felt or his abilities appreciated. Not a few of our leading London architects are provincial men, brought up in country offices, and one instance we can name of two pupils of the same master; one is now the architect of our greatest modern work, and the other is enjoying a small country practice. In this, and in many other instances we could mention, the success must be attributed not so much to superior merit as to the circumstance that the greatest man of the two has had the advantage of a wider field uninfluenced by mere local patronage, and untrammelled by its prejudices and shortsightedness.

We have said the country practitioner's work is of a more multifarious kind than the London architect's. It indeed often verges on the builder's province, and in some few instances the same individual designs and undertakes contracts, though of this class there is, happily, a small number. Every locality has its own methods of practice, though the country practitioner does a great deal more of the work which in London practice is consigned to the clerk of works. In ordinary undertakings he seldom has the luxury allowed of the latter-named functionary; and the consequence is, that with builders who not unfrequently are recruited from the ranks of bricklayers and carpenters, he is obliged to set out his own work, make full-sized details, or set them out himself as the work proceeds. This sort of labour is unknown to the London architect, and we may fairly say he seldom has to think or work to a larger or more detailed scale than the customary and highly professional "one-eighth," small and vague enough to cover a multitude of technical discrepancies; too microscopical for the contractor to declare that one course of brickwork less was intended, while it may reduce elevation and section to such general, foggy, or sketchy terms, that an architect may with conscience say such drawings include a great deal more than can be fairly shown or implied by them.

The provincial practitioner has to convey his ideas by more clearly-defined means. Eighth-inch scale plans are ordinarily translated into drawings of a quarter of an inch to the foot, and in some localities few builders would think of tendering from an eighth-inch scale set of drawings. We need hardly tell architects that the larger scale—viz., that of a quarter of an inch to the foot—really makes a very considerable difference in the amount of thought and detail which it entails. What may be represented by one line in the small scale plan or elevation requires two in the larger, and the design must be elaborated sufficiently to make it fully represent every detail and moulding, so that nothing is implied or taken for granted that is not delineated. Herein it will be seen the London architect has the advantage. His general

drawings may be obscure enough to give him the opportunity of elaborating his details to any extent, and though we will not say he does so fraudulently, the inducement to do so is often too powerful to prevent him improving his oriel windows, adding a few additional mouldings to his stone or plaster cornices, and introducing various little sundry improvements and finishes which the lapse of time, after-thought, or the progress of the work may have suggested. Country builders are a very punctilious set of men as a rule—they must see everything; mere description in the specification or quantities is not enough for those who are above scamping practices, and are desirous of carrying out their contracts creditably. Again, unless a clerk of works is engaged to superintend the practical minutiae of a work, they necessarily fall upon the architect. It is not uncommon in the country for a builder to receive the architect's instructions about such trivial details as the exact sizes of window and door frames, the setting out of stairs and winders and hand-rails, about some difficulty of mitring mouldings, and a thousand other things which it would be unreasonable to ask of a London practitioner. In some cases, indeed, we have known an architect perform all the laborious subordinate functions of foremen to the various trades rather than trust to the ability or conscientiousness of the contractor and imperfectly-skilled workmen. But the employer who calls in a London architect generally supplements him by a clerk of works; there would be some unpleasant bickerings at the wind-up of the work if he did not; and a sensitive architect would find a great deal of his *bon bits*, upon which he prided himself, seriously perverted in their meaning and intention. We know not a few London architects who owe a lasting debt of gratitude to their deputies in having exercised their discrimination in sundry matters of constructive detail and finish, in having translated a vague suggestion upon an eighth-scale drawing, or endeavoured to show a compunctionless contractor, even against his common-sense, that a little exercise of thought would be beneficial to the result.

The social position of the provincial architect and surveyor is, perhaps, all things considered, on a lower level than the well-to-do Londoner; though often the country knight of the compasses is an important personage in his locality—he may be a local magnate. Those who hold the very onerous, if not enviable, position of town surveyor are especially the butt of local-board men. His election to that office, in the first place, is generally a farce, as our readers too well know, though afterwards it assumes a more serious aspect for the lucky candidate. In a small country town various interests clash, all frequently represented by seats at the Town Council or civic bench; and, as Mr. Lewis Angell said the other day in his address before the Association of Sanitary Engineers, "it is almost impossible for the local surveyor to discharge his duties faithfully and impartially without giving offence to interested parties." Further than this, every one knows the ever-varying phase of local tactics—the reversal by one party of the work of its predecessors in office; and there is no wonder often that independently-minded though weak men sacrifice consistent motives to time-serving policy. Unless these constraints are removed by legislation, it will become more difficult to secure better and more efficient men for these important offices than the omnifarious class of individuals we have referred to—upholsterers, commission agents, and other unqualified practitioners.

#### HINTS TO STUDENTS.—II.

##### METHOD.

WHEN an architect or artist sets to work about a design, how does he generally proceed? It may be easier to put the ques-



tion than answer it. Suppose the subject is a monument—we have supposed this because it is the simplest kind of designing, involving no complexity of condition, like a house or a public building. To analyse the process of the mind in designing such a work of art would require a psychological insight into the mental and emotional faculties, and we do not intend to discuss here so recondite a question. But we may trace the ordinary connection of ideas which such a problem suggests. We may take it, at any rate, that with most minds the idea of a monument or trophy would first conjure up some image which the artist could first recollect, and that this mental impression would in nearly all cases be the resemblance of something once seen of the same kind—some picture or monument seen in travel. The next step would probably be a study or a comparison of examples, and out of the ideas thus brought together or awakened, by a conjoint exercise of the intellect and imagination, the artist would proceed tentatively, or with more reliance on his precedent, to sketch out something that shall at least please his fancy or taste. It will be seen from this brief sketch of our designer's method—and we appeal to our architect readers for its accuracy—that the method employed in such a work as we have imagined would be essentially the method known as the deductive, or one which first lays down a general rule or formula and from this builds or creates a particular example. It is the same method that was used in science before Bacon propounded his new method of universal philosophy, and applied to art under the fostering care of theology and belief, it has left us arts which surpass our own in truthfulness and power. But mark the difference: Nature and human faculty alone are concerned; the Athenian architect did not base his ideas on the Assyrian or Egyptian palaces; nor did the Middle-age artist imitate the Classic models. Each was a development perfectly untrammelled by precedent and destined for its own use only. Mediævalism invented or developed a style or system of art out of its own resources; it did not revert to Pagan notions, in general forms, at least; while we are following a precisely opposite course, and call our works after one or the other. The fact is, the ancient architects worked as much by the Inductive as by the Deductive method, and the fault with us is, we pursue only the latter. Unfortunately, Classic models have descended to us only to make us slaves of imitation rather than builders on experience; they have not left us the method of their originators—only the bare result; and until we can get once again into the true method of progress, our art will be only so much wasted energy. The works of Bacon and Locke, Pestalozzi and Herbert Spencer, while they have spurred on every species of knowledge by showing us that the business of education is the development of self-faculties, instead of cramming and overburdening the memory with an undue quantum of heathen mythology and a mischievous reverence for the works of antiquity, has left art still under the dominion of the Platonic method, in which reason and self-development are disregarded. Rules and names, and dogmatic utterances, rather than facts and things and positive ideas, a series of tasks, and the enthronement of memory over every other faculty, was the atmosphere in which modern architecture grew. These conditions have influenced all our practice and modes of instruction, and it is no wonder the student follows this method in preference to one founded on actual ideas derived from experience or sensation. In our schools and universities we have just discovered the mistake in the system of education which has prevailed. Technic schools, laboratories, and workshop teaching, are supplanting the dicta of academism; and the once contemned practical sciences are taking the place of Classics in our Middle Class and

Board schools. What says an astute writer? This system could only tax the memory; it failed to accomplish its avowed object. "To remember, recite, and admire what the ancients had done, was the highest end it proposed. It therefore produced a race of slavish imitators, and not a race of original, vigorous, and practical thinkers." Bacon ranks the achievements of memory with the exhibitions of a mountebank. Locke also held the same view, regarding the end of education to be the synthetic and demonstrative through the agency of sensation or objective teaching. Euclid was once the Alpha and Omega of geometry; common-sense definitions and practical application were beneath the scholarship of our schools. But now practical and solid geometry is beginning to be acknowledged as the most prolific in practical results, and the proper precursor of "demonstrative" geometry; the same with Mechanics and Physics. Now, what we contend is this, that architectural instruction should proceed on the same practical basis. The facts and principles should be grouped together in a natural order, and not be studied independently of each other. Stone-cutting or masonry, instead of being picked up in works after the "principles" of design in the office have been acquired, should go hand in hand; the pupil should be taught in the workshop before the office; and all the teaching pursued at our societies as class teaching should be accompanied by the materials and tools of artificers. The idea may appear preposterous to many; but it is one as easily accomplished as any other reform. Apprenticeship indentures should stipulate workshop experience, and half the battle would be won. Let us examine more closely the methods to be followed. Technical workshop knowledge should initiate the pupil with the instruments and materials of the workman. The pupil may, for example, be set about the task of utilising a balk of timber, or some small scantling as a batten, in the most profitable and wasteless manner; after which he may be set to execute models of trusses and timber frames, or be allowed to frame timbers together, so far as to become acquainted with joints, and to exercise his own selection of the best. In this stage also, the experimental knowledge of the strength of timber may be acquired, the methods of building up beams, scarfings, mortices and tenon, shoulder joints, flooring, and other varieties of joining. Skill and ingenuity, rather than workmanlike finish, should be the main points in such a technical training. These *vis-a-vis* processes should be accompanied, if possible, by the drawing-board and instruments; the student should be set to draw the subjects which he thus manipulates; and we would point to the absurdity of giving small scale drawings at this stage. An inch and a half or three inch scale should be used, and the examples given at first should be thoroughly of a practical character, be projected in plan, elevation, and section, and thoroughly figured. Indeed, working drawings of roof-trusses, floors, joinings, and other kinds of framed work should be given to the pupil, rather than elevations and complex sections of entire buildings or tracings of such; so that the interest in his work may be sustained as he proceeds to the concrete forms, instead of, as now, by the reversal of this mode rendered less stimulative, by finding, after he has become a good copying draughtsman, that he has actual design and practical detail to learn. Is not learnt at school, practical geometry and projection should form a part of this training. Projection is anything but a profitable or interesting subject for a student if he confines himself merely to books; sections of solids, and the development and intersections of surfaces, may be better learnt at this stage; for the student can ocularly test any doubtful point, and bring to bear upon his professional wants those problems which are most useful, while the study of so necessary an art, at this stage, would be particularly

suggestive to the inventive or inquiring mind. We have here only indicated one branch of workshop practice, but this may, according to opportunity, proceed simultaneously with one or two other branches, as the stonemason's, or the smith's-shop, though one branch at a time, thus pursued with office or class study, would be quite sufficient.

It will be seen from what we have said that the inductive as well as deductive methods would be called into practice in this way, or the synthetical and analytical processes of the mind would both be developed under the most favourable conditions. Our science schools have already developed this plan of instruction. At Owens College, Manchester, King's College, Cooper's Hill, and other schools for technical study, we have the workshop element largely developed. Experience is made the groundwork upon which the student builds his education, supplemented by the deductive mode. That we may develop a like system in architectural instruction will be better seen as we proceed in detail.

#### VAULTING: ITS VALUE IN ARCHITECTURE.

GRANTING the interest and value of the subject of vaulting to the architect, it hardly appears to us to be one to occupy the time and attention which the Institute of Architects has so graciously bestowed upon it. Mr. Eagles has no doubt produced a well-thought-out essay on the subject of Vaulting, and one which has at least won the distinction of the Institute's favour in obtaining a prize medal. Why this essay, which we printed in extenso at the time of its reading last session, should have, in an especial manner, become the subject of discussion at the Institute, may fairly enough admit of question. In the absence of a fresh topic of discussion, however, the Institute hit upon at least a well-trodden ground and an elevated subject. A very commendable theme it was when Ware composed his noted "Tract on Vaults," and when the architects of the last century turned their attention from the Greek lacunaria to the magic skill and art which covered our cathedrals and minsters with such beautiful constructions of stone, which vie in scientific knowledge with, and excel in excellence, the stalactite ceilings of Moslem palaces. It was reasonable to imagine when Gothic architecture displaced its rival in the eyes of architects and amateurs, that one of its leading characteristics—indeed, its boasted excellence, the very acme of its art—should have become a thesis for learned geometers and archaeologists. There was a prolific field of inventiveness displayed which emulated the ingenuity of the greatest geometers and architects, and which kindled the enthusiasm of the young architect. After Ware, Nicholson laid down the principles of vaulting in his well-known treatises on Projection and Carpentry, and the covering of many of our earlier pseudo-Gothic churches with vaults in lath and plaster exercised architects, as well as taxed the art of the carpenters of those days. There was a good excuse then for paying a great deal of study and attention to the recondite and almost lost art of the old Freemasons, but such excuse does not exist now. We can't roof in stone as they did in the Middle Ages, not because we have not equal if not better means of doing so, but because we do not possess stone in sufficient abundance to throw it away in thick walls and massive buttresses and counterforts, and because we have more economical methods of construction, and materials which require other treatment. So far, then, the discussion of such a topic is somewhat unnecessary. We have ample treatises on the geometrical principles of vaulting and groining, and if our architects are not so conversant with it as they should be, it is their own fault. Upon what the discussion chiefly turned



on Monday night is a significant question, though difficult to answer. If some new kind of material, of a light or porous kind, were the subject, or even a return to plaster vaults, we could easily understand it; but a *résumé* of the modes used by the Mediæval architects in covering their churches, and a prolix conversation on some curious examples, interesting enough in a graphically written paper, is surely a rather unprofitable affair. As it was, the attendance was miserably small, and absentees were, no doubt, wondering what new light was about being thrown on a very ancient, if not obsolete, question of construction. The question how to vault a given space most economically, how to apply vaulted ceilings to churches in the most unobjectionable manner, or how iron ribs may be combined with a light kind of filling-in, and exercising little or no thrust on the outer walls, singularly enough did not enter into the discussion, or was barely hinted at. One of the most important applications of vaulting is that of covering places whose walls do not require more extraneous support than their disposition alone affords, and in this direction the problem of vaulting may be profitably pursued without encroaching upon or limiting us in the use of our new materials. Again, it is singular the system of spherical vaulting as adopted by the Byzantine architects after the decline of Roman art, and exemplified in Santa Sophia and other Byzantine churches, has not been more adopted by architects. For large halls and churches in which sound and sight are essential, no other kind of vaulting can compete with it, simply because the supporting piers may be few, and placed at the angles, and the counteraction of pressures may be secured almost ad libitum by the intersections. By at least a combination of the Roman and Eastern methods, or the cylindrical cross-vault and the spherical, the surfaces or filling-in being of hollow bricks or pots, any building might be covered or ceiled, but we think no exclusive or archaeological use of any particular system or species of vaulting can ever become anything else but a failure. The whole failure of modern architecture has arisen from adopting in its entirety, and after a piecemeal fashion, some particular system of ancient work, with no relation whatever to the more pressing questions of economy and material. Our own great Renaissance architect, Sir C. Wren, has adopted the domical kind of vaulting at St. Paul's with admirable effect, and far surpassing the cylindrical vaulting adopted at St. Peter's and other Roman structures, while Sir John Soane, an excellent master in vaulted ceilings, has left us many instances of his fertility of invention in adapting the Byzantine system to the covering of variously-shaped chambers, as in the Bank of England, the spherical surfaces being composed of some light substance like pumice stone or hollow pots, so that their thrusts may be reduced. Such descriptive particulars as we were treated to the other night, highly interesting in themselves—such, for example, as the first adoption of the pointed form of cross vaults, the relative values of vault surfaces and groin-ribs, the merits of the Gothic system over the Roman vault surfaces, in which latter the groin-ribs were abandoned to take their chance as subordinate and irregular features, instead of becoming the constructive and supporting ribs; the improvements successively effected by the introduction of elliptic groin-ribs, and compound circular ones; and the increased decoration which such inventions as the tiercerons and formerets and conoidal and fan tracery created—are all important as historical changes in the development of the simple barrel vault into the perfect conoidal or fan groining, but they are not the practical problems which the architect has to deal with now, or which especially call upon his time and attention. It is a very pleasing amusement to engage in any speculative opinion

upon the origin or practice of Gothic art, and the questions involved of the higher kinds of geometry which vaulting illustrates are especially worthy the study of the younger members of the profession; but as architects and progressionists we must not stop here, but try to evolve, if possible, some more practical and immediate issues of these questions. Architects have been too long dallying with the ingenious devices of Classicists and Mediævalists; their speculations and discussions have partaken too much of the descriptive turn; but let us now try and see whether we cannot also be a little inventive. There is something in antiquarianism and all such learning, we fear, a little too repugnant to originality or progress in architecture.

#### EFFECTIVE SEWERAGE.

WE have recently directed attention to several modes of sewage utilisation more or less depending upon mechanical or chemical means of separating the noxious from the innocuous matters, and rendering one or both valuable for agricultural purposes. All these methods attempt, more or less effectually, to disinfect at the outlet without attempting to cope with the more immediate danger to which every house in direct communication with the sewers is exposed. To eliminate the disease-laden atmosphere, to cut off communication with the sewers, to preserve ourselves intact from any chance of infection, have not been the objects of our hygienists so much as to purify our rivers and water-courses, and fertilise sterile lands. The latter are great gains, no doubt, which the outlet remedies more or less secure for us; but we have need of a more immediate and direct remedy—that of making our houses perfectly exempt from all infective influences. No house enjoys this immunity at present; we are constantly within the reach of infection from the common source of communication and contamination, and, we believe to this cause we must assign the spread of epidemics among our populations. The working of the Public Health Act, since the commencement of its operations, has been slow and unsatisfactory, owing to its permissive character, and to the obstacles placed in the way by small property-holders and the stubborn indifference of provincial towns. But great as its work may have been in removing the sources of disease, and in carrying out systems of sewerage and water supply, there remains the source of danger of connection, aggravated by the absence of any system of ventilation to our common *cloaque*.

C. T. Liernur, in the *Times* of the other day, revives a method of separate treatment which we have previously mentioned. It consists of a prompt and thorough removal of all excrementitious produce in such a manner that the inhabited place, in its soil and air, should be free from all *fecal* impurities. To accomplish this he excludes all putrescent matter from the common sewer, so "that the fluctuations within the sewer could not expel its germs into the atmosphere," nor pollute the soil. All refuse and sink matter is to be removed daily from every house and street before fermentation or the generation of any infective germs can occur. This is done by separate drain-pipes worked upon pneumatic principles. Quoting Mr. Liernur's remarks: "From the moment of deposit in midden until the time when the whole is converted into an innocuous dry manure, all putrescible matters are kept prisoners, nothing being allowed to escape into air, soil, or stream. The dry manure also is exposed to a heat sufficient to deprive all organisms of disease of vitality."

To illustrate these remarks, we may instance the sanitary condition of Lewes, in Sussex. Dr. Thorne Thorne, the Local Government Inspector, has stated how the recent outbreak of typhoid fever in that town has been caused. During the last three months there have been 450 cases of fever and 27 fatal cases. The disease appeared

in all parts of the town, and the only common source assigned by the inspector was the use of the Company's water. The town water-drinkers were generally attacked. It appears the pollution of the Company's water originated from the contamination of the River Ouse, which receives the town sewage. The inlet of one of the reservoirs was thus rendered foul. Another more serious cause was assigned, namely, the foul air and diseased germs of patients drawn into the water mains, facilitated by means of pipes direct from water mains into closet pans, the water supply being intermittent. Each time the water was turned off the main, foul air was thus sucked into the pipes from the closet pans. Since a constant supply has been adopted, the epidemic appears to have abated. Every sanitary precaution suggested by Dr. Thorne has been complied with by the sanitary authorities. The intermittent system is, there can be no doubt, open to the objections mentioned wherever a communication exists between closets and the mains. It becomes, therefore, a serious question whether there should not be some more effective means of drainage adopted that shall instantly remove the excrementitious matter and render our closets powerless for evil. This is more urgent, because we have no efficient system of ventilation, and the germs of disease are thus rendered active in mischief long after deposit takes place, every commode becoming, in fact, an ineffectually-sealed entrance to the sewers for the escape of all that is dangerous in sewerage. M. Liernur's plan is to instantly disinfect all putrescible matter to convey it away in distinct drains, and to remove it in a harmless form as a compost from our houses, so that there shall not be any risk of the atmosphere becoming tainted or infected with the seeds of disease. As to the drainage of the soil, he adopts the views of certain hygienists, which is to keep the subsoil-water at a certain level, so that it should not be able to rise and thereby expel into the air any germs of disease it may contain. The two kinds of drainage are thus distinctly separated and treated. This plan strikes at the root of the mischief, and consists in removing, not in diluting the evil to render it innocuous, in rendering the air perfectly free and uncontaminated, and thereby destroying the cause of disease rather than mitigating it.

#### CHURCH OF ST. JOHN THE DIVINE, KENNINGTON.

AMONG the new structures which have lately risen in the southern suburbs of London, the Church of St. John the Divine, Vassall-road, Kennington, has more than ordinary claims on our notice. In plan it has one feature that distinguishes it from the ordinary structure, namely, the spaciousness and width of its nave, which is 34ft. in span, and 125ft. in length, embracing at present four bays, and covered by a roof such as we have not been in the habit of seeing over our new churches—a tieless waggon-shaped wooden vault. This feature alone gives the church a marked character; and it is so unlike the customary displays of framed trusses, or the spindling-looking king-posts and ties which have recently done duty for them, agreeably to the fancies of our fashionable church architects, that we have the greater satisfaction in being able to point to a new church of a more successful type, designed by a gentleman now recognised as the leader of a particular school in ecclesiastical art. We hope the example may be emulated, and that we may in a short time see more of these wide, open, and simple ceilings over our churches. Of course, much of the foolish adherence to a narrow nave of the regulation width of from 20 to 24ft., has been due to the overbearing rules of Church Building Societies, which have been founded upon ancient precedent rather than actual demands. But in looking at this church, which Mr. Street has designed, another noticeable peculiarity is met with—not original, but still un-



common—and this is the absence of a clerestory. We are inclined to think the absence of this customary, though to a certain extent useless, appendage, has in some degree added to the strikingness of this church. Clerestories are useful expedients for lighting in crowded town localities, but to see a lofty clerestory added to a church, as it very generally is, simply to give height and a certain air of ecclesiasticism, is, to say the least, a very wasteful and costly piece of vanity. Entailing additional thickness of piers and walling, increased height, and consequent space in which the voice of the celebrants is lost and the auditory considerably reduced, the advantages, if any, are completely neutralised, while a narrow, lofty nave is not only an acoustical but an architectural mistake. In the church at Kennington, Mr. Street has made the most of his opportunity. The church stands between two streets, and occupies a corner site, which gave facilities for lighting both sides with large aisle windows. This has been well seized: large windows are introduced, and a considerable height of aisle walling is obtained, through which the whole church is well lighted. Another feature must be noticed. The interior bays of arcade are unusually wide, and each bay or arch embraces two of the large aisle windows. More than one advantage is secured by this arrangement: the chief is the openness and unobstruction of the interior by piers, and the consequent height given to the arches, adding immensely to the spaciousness and imposing appearance of the church, besides the other advantages gained of greater available space and economy. There are not many churches built upon this single-roof arrangement. We may name the Temple Church as a notable example; but in all cases where it has been adopted a gain in architectural effect has been realised. These, then, are the main features that strike one on entering this church:—width and spaciousness of nave, wide bays, and large aisle windows, without the use of a clerestory. But let us examine some of the details of the church. In plan it has a total length of 170ft. by a width of 60ft., viz., a nave 125ft. long by 34ft. wide, a chancel with apsidal end 45ft. long by 24ft. wide, lady chapel, clergy and choir vestries, organ-chamber on the north side of the chancel carried on the groined roof of a cloister, and a baptistery forming a semi-circular recess or apse thrown out of the south aisle at the western end and opposite the north entrance. A rather pleasing expedient has been adopted in reducing the nave to the diminished width of the chancel. This is effected by inclining the eastern bays or arches, which are of narrower span than the others, to the reduced width of the chancel—a far more satisfactory plan than the common one of abutting the nave arcades against the chancel wall. In the ceiling the sloped bays die out at the ridge line as groins. The wagon ceiling of nave is an obtusely-pointed arch boarded longitudinally, with moulded ribs, transversely and diagonally disposed, springing from pier-shafts, which are carried up through the capitals: the apices of these ribs meet at the ridge, and the effect of the ribbing is that of a groined vault. The ceiling is 60ft. in height, and the intention is to decorate the plain boarded surfaces when means allow. A low stone screen separates the nave from chancel, and 11 steps lead to this level, which is 6ft. higher than the floor of nave. An elaborate reredos, with a figure of the late Bishop of Winchester, is placed over the altar, other painted Scriptural subjects being introduced on an ornamented and gilded ground. The Nine Virtues adorn the base-ment in panels. The central figure of the reredos is a life-size statue of the Saviour on the Cross, supported on the right side by St. John (the patron saint), the good Centurion, and Joseph of Arimathea, the extreme figure being the late Bishop, Dr. Wilberforce, in a kneeling position. The prominence given to the Bishop is probably due to the fact that he was the chair-

man of the building committee, and laid the first stone. On the left side of the Saviour are the three Marys. Other figures, representing the Fathers of the Church, St. Augustine, Ambrose, Jerome, &c.; and the Evangelists fill up the altar end.

One of the clergy, Rev. C. E. Brooke, has contributed the stained glass to the three double apsidal windows over the altar, representing the Adoration of the Lamb. We may add that the church is built of red brick with stone dressings; the window tracery is rich and varied, and the aisles are crowned by elaborately-wrought pinnacles over the buttresses of a strictly unique design. Interiorly the shafts and arch moulds are of stone, the former being composed of boldly-wrought and relieved shafts separated by deep hollows. The wall surfaces are of simple red brick facing neatly pointed, and contrast agreeably with the stonework. We may notice that the bricks used are less in depth than ordinary bricks, and have been specially moulded by the architect for the New Law Courts. The church accommodates 1,000 persons in movable chairs, and has cost already £18,000, with the western end to finish, and a tower and spire 200ft. in height to erect. The total estimated cost is computed at £25,000. It is scarcely necessary to add the church is of an essentially Ritualistic character, though it is some augury of the solution of the church-building problem that a large unobstructed area for the congregation has at least been in this case attempted, and with success, under the conditions of a High Ritual church.

#### ROYAL INSTITUTE OF BRITISH ARCHITECTS.

AT the ordinary general meeting of this Institute, held on Monday evening last Mr. George Vulliamy, V.P., in the chair, Mr. Eastlake announced the deaths of Mr. G. Gutch, Fellow, and of Messrs. F. Atkinson and A. H. Thompson, Associates; and Mr. R. W. Billings, formerly an Associate, and who retired from the Institute in 1863. Prof. Donaldson paid a brief tribute to the life and labours of the late Mr. Billings, referring to many of the points touched upon in the memoir which appeared in last week's BUILDING NEWS, and remarking that his "Ecclesiastical and Baronial Antiquities of Scotland" brought to the knowledge of the English school of architects a very peculiar class of buildings. In this work Mr. Billings was assisted by Messrs. Burn and Ballantyne. Indeed, Billings, Burn, and Ballantyne were at one time known as the "Three Busy B's," and the works which they produced were highly creditable to them, and to the art and architecture of Scotland. With regard to the late Mr. Gutch, Professor Donaldson said he was a firm friend of the Institute, a man of high honour, and a great benefactor to the poor. Mr. Eastlake next read a letter from Mr. Street, formally expressing his acknowledgment of the honour conferred upon him by his nomination as the recipient of last year's Gold Medal of the Institute. Several donations of money and books to the Library were announced, which afforded Professor Donaldson an opportunity of calling attention to the very valuable collection of architectural books now to be found in Conduit-street. The Institute Library was, he said, without doubt, the best architectural library in the whole of the United Kingdom, containing, as it did, not only all the works of the ancient writers, but those of the moderns. The Professor also called attention to the concluding paragraph of an address delivered by Mr. Boulton before the Liverpool Architectural Society, on a recent occasion, which contained a reference to the relative positions of architect and workman which, the Professor thought, was derogatory to the dignity of the profession, inasmuch as it was nothing more nor less than putting architects and workmen in the relative positions assigned them by the *Quarterly Review*. He was sorry to see such opinions enunciated by a Fellow of the Institute, especially as he was addressing a professional society.

#### DISCUSSION ON VAULTING.

Sir EDMUND BECKETT, Q.C., said he had read Mr. Eagles's paper,\* and also that published

\* See BUILDING NEWS, Vol. XXVI. pp. 625 and 626.

many years ago by Professor Willis, and he confessed he did not know what were the points to discuss. He happened to meet Mr. Fergusson on the previous day, and asked him whether he was coming to the Institute to take part in the discussion. "What is there to discuss?" asked Mr. Fergusson, adding "We know all about vaulting; all we have got to do is to make a vault." He (Sir Edmund) did not see that there was much analogy between domes and vaulting. There was this essential difference: a dome stands on a supporting surface all round, while a vault rests on four points only. He had pointed out in his paper on Domes that there must be an essential difference between vaults and domes, but he would rather defer his remarks until some other gentlemen had taken part in the discussion.

Mr. G. H. WEST accordingly opened the discussion by reading what was virtually another long paper "On the History and Development of Gothic Vaulting." Mr. West said he agreed with Mr. Morris in wishing that he knew more of Roman vault construction, for the little that he had seen at Nismes and Arles had filled him with extreme admiration. It was true that the buildings in those two towns were strongly imbued with the Greek spirit, and were far superior in the thought and artistic feeling shown than many buildings in Italy. M. Viollet-le-Duc went into Central Syria to find the origin of the Romanesque buildings of the South of France, but at Nismes and Arles every point on which he laid stress was found in quite as great perfection as at Chagga. These buildings were the more important since it was certainly from them that the architects of the Cleric or Clugny school drew their inspiration; while the Northern or Ile de France school owed not a little to the builders of Clugny and Verzelay. The Romans used two sorts of vaults, the barrel vault, and its derivative, the groined or intersecting vault. When the Romans built a barrel vault of masonry—which they comparatively seldom did—they did not make the courses break joint as we did, but composed it of a series of juxtaposed arches, made up of very large stones of uniform size. A centre was placed at each joint, but no continuous centering was necessary, while one template would serve for all the vousoirs. There were many examples of this vault at Nismes, Arles, and Pont du Gard, and the same system was made use of so late as the end of the twelfth century, in the wonderful bridge over the Rhone at Avignon. Still further economy was obtained in the so-called Baths of Diana at Nismes, by separating these juxtaposed arches by about their own width, and using them as centering to carry the concentric covering of thin slabs, as described by Mr. Eagles. A still further step was taken in the outer ground-floor gallery of the Amphitheatre. Here there was a transverse arch carried on corbels against each pier of the arcading. These arches carried a continuous centering on which a rubble barrel vault was laid. When the Romanesque builders began to vault the naves of their larger churches, they naturally made use of the barrel vault, for they found a difficulty in covering an oblong space with an intersecting vault, and it was not always possible to cut up the nave into square compartments. Besides, all these early vaults were meant to support the tiles without any wooden roof, and the barrel vault was therefore indispensable. This was constructed by means of a permanent centering of transverse arches, like that at Nismes, while the aisles were covered by a series of wagon vaults, perpendicular to the nave and concentric with the pier aisles. These perpendicular barrel vaults thus formed a continuous buttress against the central vault. This system, which exists at Limoges, and is common in Poitou, had several inconveniences. The only windows possible were in the aisle walls; the upper part of the vault was in darkness; and there was no triforium gallery. It was curious, though, that they never hit upon the system adopted in the twelfth century in certain wooden-roofed churches of Champagne, of placing a separate roof over each vault, and so getting windows over the piers of the nave. This system gave rise to a series of churches of extreme interest, all more or less resembling the Basilica of Maxentius at Rome. The earliest examples of them are Notre Dame des Dames at Avignon and St. Trophime at Arles. From them arose a set of churches which we should do well to study more closely in England, as it did not seem right that the Church of England should let herself be beaten hollow by the Nonconformists in the matter of making buildings adapted to her services. The three-aisled cruciform church was



about as ill-adapted to our purposes, especially in great towns, as any form that could be invented. Mr. West said he could imagine none more fitted for our requirements than such buildings as the two churches in the town of Carcassonne, the Taur Church, and that of the Cordeliers at Toulouse, and, lastly and especially, the Cathedral of Alby. In all these there was a wide nave without aisles, vaulted generally by a Gothic vault and lighted by rose windows in the wall arches. The buttresses were brought inside the church, and the space between them was converted into chapels, roofed, either as at Cordeliers, and originally at Avignon and Arles, by a series of barrel vaults perpendicular to the nave, or, much less reasonably, by a Gothic vault. Having traced how every slight modification of the arches and the vaulting led to alterations throughout the entire building, Mr. West noticed the methods employed in filling-in; and, in conclusion, said Gothic architecture was the result of the closest possible reasoning. The men of the Middle Ages were anxious to build like the Romans; but with an analytical spirit worthy of the Greeks, they said to themselves that it was not building like the Romans merely to copy the outward forms of their buildings; that if in Roman vaults a skeleton was needed to carry the outward form, it was right that this skeleton should be shown, and that every member should tell its own tale; that form and structure ought to march hand-in-hand; that if when conditions changed one had to give way, it must be the former, and not the latter. By following out the principle, instead of keeping the form, in the Roman vault, regardless of the result to which they were tending, they ended by creating the most complete system of architecture which the world had seen, and one whose beauty no one would deny. For the last three hundred years we had been copying outside form, and every style in turn, and we might go on for ever copying and commenting upon Roman and Greek, Gothic, and Queen Anne, without producing a true architecture. True architecture was that which was true to its programme, and true to its means—which exactly, scrupulously, and economically fulfilled the conditions imposed by a want, and employed its materials without waste, according to their qualities and their properties. That which was now considered the all-important question, the form, was but a secondary condition, certain to be satisfactorily fulfilled by adherence to the ruling principle. He could not help thinking that if Ictinus and Agrippa and Robert de Coney could come back upon earth they would each claim as Greek, or Roman, or Gothic, not the Wal-halla or St. George's Hall, not St. Peter's at Rome, nor the Colonnade of the Louvre, nor any of the foremost modern Gothic buildings, however beautiful they might be, but, in spite of all their faults and possible lack of beauty, such buildings as the Crystal Palace and the Albert Hall, the roof of St. Pancras Station, and the dome of the Vienna Exhibition, Menier's Chocolate Manufactory at Noisy, and the parish-church of Rambouillet. The architecture of a people ought to be the expression of its daily life and wants, and homogeneous in all its parts. Gothic architecture was so. Could as much be said of ours?

Mr. EDMUND SHARPE (in a letter which was read by Mr. Eastlake), said there could be no doubt that the introduction of vaulting into the churches of the Middle Ages affected very materially their design, but this was not so much the case in those times and in those countries where the simplest and earlier forms of cylindrical or barrel vaulting were practised, as in those in which the cross vault formed by the intersection of two barrel vaults at right angles to each other became prevalent; for the earlier and simpler longitudinal barrel vault pressed equally and uniformly on the wall which carried it, and it was therefore pretty nearly of uniform thickness throughout, whereas the cross or quadripartite vault brought the whole of the weight on the vault, and the consequent thrust outwards, down to a certain point only of the longitudinal clerestory or aisle wall, and had to be met at this point with an equivalent resisting force. There was, however, one device of the builders of these longitudinal barrel vaults of the eleventh century which was worthy of notice before considering the effect produced by the introduction of the quadripartite vault in the designs of the period. Throughout the whole of the south of France these barrel vaults, whether circular or pointed, were

generally adapted for apteral or aisleless churches, the side aisles of which were made sufficiently strong to offer, with the addition of shallow buttresses at certain intervals, a sufficient resistance to the lateral pressure of the vault. But in the case of the larger conventual or cathedral churches, where side aisles and a blind story or triforium occurred, it was not uncommon, in order to afford additional support to the clerestory wall, on which the main vault rested, to throw half of a semi-cylindrical barrel vault across from the top of the aisle wall, over the triforium, to the base of the clerestory wall. It was obvious that we had in this device the idea and suggestion, if not the actual results, in a continuous form, of the flying buttress, which became, in a detached form, the chief support at certain intervals of the quadripartite vault of a later period. The noblest example extant of this continuous longitudinal semicircular barrel vault supported by a continuous demi-semicircular vault (so to speak) over the triforium, was in the grand five-aisled church of St. Saturnin at Toulouse, commenced in 1060 and consecrated in 1090. When, however, the quadripartite vault became common, new forces were created, whose treatment demanded the chief attention of the designer. The vault became, in fact, not only the fireproof covering of the whole building, but the chief member of the whole design, and Mr. Sharpe's belief was that from this moment the architects of the period thought and designed downwards instead of upwards. The capacity of the building being fixed, they began their design by first laying out their main vault and their clerestory walls; they next designed the arches which were to carry these walls and the mouldings with which the latter were to be clothed, and, lastly, decided on the bulk and form of the piers that were to carry these arches, instead of beginning, as probably most architects did at the present day, by arranging the ground plan first and the covering of the building last. Quadripartite vaulting on a large scale was not known in England until long after it had become prevalent on the Continent, but the whole of the side aisles of our Norman churches were usually vaulted in this manner. Mr. Sharpe concluded by suggesting, where the means were adequate, the more frequent adoption in modern designs of this mode of ceiling a church, as a more fitting employment of superabundant resources than the gaudy decoration of its walls and fittings now so prevalent. As an encouragement to those who were inclined to agree with him, he would suggest, as a means of lightening the weight of such vaults and of minimising their cost with which our Mediæval predecessors were not acquainted, the use of hollow fireclay bricks, which might be made so light as to render it unnecessary to employ flying buttresses, and for which an inexpensive centering might, he thought, be easily devised. Bricks of this nature, whether used for the groining ribs or the coursed working in the vault cells, might also be made, at little or no additional expense, to contribute to the architectural effect of the vault.

Sir EDMUND BECKETT was very glad to hear Mr. Sharpe's suggestion for the increased use of the vault in lieu of spending large sums on gaudy decorations and trappings. As to the use of hollow bricks, they were employed by Professor Cockerell in the vault of the Cambridge University Library, although not in the most scientific manner. As to barrel vaults, they could not stand unless upon an enormously thick wall. Mr. Eagles had denounced fan-vaulting as debased, because the multitudinous ribs did not serve any constructional purpose. But it should be remembered that these ribs were the lineal descendants of the ribs in the earlier vaults, and that the vault to which they were attached was a perfect construction. He did not think it was at all fair to thus depreciate what was the only genuine characteristic of the Perpendicular style, apart from towers. Fan-vaulting was a distinct and original characteristic. As to the question of congregational churches, which had been incidentally raised by Mr. West's remarks, if it were true that the prevailing type of church was so unsuitable to modern requirements, it was strange that the Dissenters were everywhere building aisled and clerestoried edifices, so that one hardly knew a chapel from a church now.

Mr. CARPENTER was glad that Sir Edmund Beckett had said a good word for the fan-vaulting of the Perpendicular period; because Mr. Eagle's remarks on that point were very sweeping.

Mr. H. W. BREWER expressed his belief that

the ribs in vaulting were not constructional, and he quoted instances, one of them being at Netley Abbey, in which the ribs had absolutely dropped out, and yet the filling-in or panelling remained. In his opinion, the ribs were purely ornamental.

Mr. EDWARD HALL maintained that the ribs must necessarily be constructive.

Professor KERRE said that the real question raised in the discussion was whether vaulting as a mode of roof-construction was capable of being revived with any practical advantage, and, if so, whether it was likely to be carried to still greater perfection than it attained in the Middle Ages? He thought both these questions might be answered with a decided negative. We had now other modes of construction and other materials than stone to deal with, and the whole spirit of scientific construction was far in advance of such a system of roofing as that afforded by vaulting. The arch, even, had been almost totally abandoned by engineers, and it seemed to him that the science of vaulting was now interesting chiefly from an archæological point of view.

Mr. EAGLES having briefly replied, an unusually protracted meeting was brought to a close.

#### COMPETITIONS.

HOUSES OF PARLIAMENT, CAPE TOWN.—We extract the following from the *Cape Argus*, of Nov. 5, 1874:—"At a meeting of the Commission yesterday, the following results were arrived at: To the plan marked 'Spes Bona' has been awarded the 1st prize of £250; to the plan marked 'Economy,' has been assigned the second prize of £150; while to the design marked 'Alma,' the third prize has been given of £100. In addition to these, honourable mention has been made of the plans marked 'Southern Cross,' with a recommendation of a bonus of £100 to their author. The designer of 'Spes Bona' is Mr. Freeman, of the Public Works Department. The authors of 'Economy' and 'Alma' are English architects, whose names we do not happen to have heard; and the designer of 'Southern Cross' is Mr. Charles Read, of the once well-known firm of Walcher and Read, the architects, in Cape Town. The peculiar and almost conspicuous excellence of 'Spes Bona,' we are told, depends on the admirable internal arrangements it provides. Turning next to the designs marked 'Economy,' nothing could be more exquisite than the artistic perfection of their draughtsmanship. Some of the interiors, too, were admirable, and there was an elaborate conscientiousness about the working up of the whole. The design was, therefore, rejected as a whole, though approved for a second prize. Third on the list came 'Alma,' in favour of the commanding appearance of whose elevation we believe the Commissioners were unanimous." "Economy," is by Mr. John Sulman, A.R.I.B.A., of 1, Guildhall Chambers, Basinghall-street, E.C.

A NORTH BRITAIN correspondent says:—"A building committee advertise for designs for a church and spire; church to be seated for 750, and to cost £1,800; and the accepted design, or rather the author of it, to get—how much do you think?—twelve guineas! I hope no one will respond to their call."

THE MARGATE DRAINAGE COMPETITION.—A meeting of the Margate Town Council was held on the 27th ult., in pursuance of a requisition to the Mayor signed by Aldermen Pickering and Knight, and Councillors Sear, Gibson, and Hermitage. Mr. Alderman Pickering observed that it appeared to the requisitionists absolutely necessary, to prevent stagnation of the business, that the Council should now consider what further steps should be taken in the Drainage matter. At a meeting last week the Surveyor read a report, and he now thought the Surveyor should read to the Council his report on Mr. Angell's amended plan. He made a motion accordingly, Mr. Alderman Knight seconded, and the Surveyor having done so, Mr. Pointon moved, and Mr. Saunders seconded, that this supplemental report be printed. The motion was carried. After some discussion, Mr. Sear moved that the consideration of the question should be adjourned until after the Surveyor's report had been printed. They could then consider the whole question. Mr. Pointon seconded. Mr. Alderman Pickering moved that the plan of "C.E." be opened and examined, and that the Surveyor be requested to report upon it, and print his report in conjunction with the report on Mr. Lewis Angell's plan. Mr. Fagg seconded. The amendment, however, was ruled to be out of order, and the original proposition was carried.



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## ILLUSTRATIONS.

EAST MASKALLS, NEAR LINFIELD—HODSACK PARK LODGE, NOTTS.—ST. TROPHIME, ARLES—ANCOURT CHURCH—CHATEAU ST. MICHAEL, CANNES—VILLAGE SCHOOLS AT NORTON AND HAMPTON, EVESHAM.

## OUR LITHOGRAPHIC ILLUSTRATIONS

## MARKETS AND FOUNTAIN AT BOMBAY.

THE Arthur Crawford Markets, Bombay, illustrated last week, are built of buff-coloured stone from the Gorla quarries; arches, &c., are of white and light-red stone from Porrabunda and Bassein. The view shows the chief entrance, with municipal offices and screen wall. In the three centre arches are white marble bas-reliefs executed by Mr. Kipling, of the School of Art, Bombay, the subjects representing Indian agriculture, irrigation, and market scenes. It covers a space of almost three acres, and the total cost of fish, meat, and vegetable markets was about £60,000. The fountain, also illustrated last week, is in the centre of the market inclosure. The sculpture, by Mr. Kipling, represents the spirits of the four rivers of India, and aquatic and other animals, &c., and Indian plants. Executed in Porrabunda stone. The architect is Mr. Wm. Emerson.

## VILLAGE SCHOOL, HAMPTON, NEAR EVESHAM.

This school is built with red bricks, blue bricks being introduced in bands and with Bath stone dressings. Half timber is used in the teacher's residence, to be in keeping with the surrounding houses and cottages. The schoolroom gives accommodation for 100 children, and is built according to Government rules and regulations. The total cost, including boundary walls, &c. (but exclusive of site) was £1,000.

## THE NORTON SCHOOL, ALSO NEAR EVESHAM.

Is built with red brick and Bath stone dressings, bands of moulded blue bricks being likewise introduced. The school accommodates 80 children, and cost £800, exclusive of site. The builder in both cases was Mr. Harvey Hunt, of Harrington. Mr. Geo. Hunt, of Evesham, being the architect.

## CHATEAU ST. MICHAEL, CANNES.

Built two miles on the east side of Cannes, on the road towards Golf Yuan, is situated on an eminence overlooking the Mediterranean, and commanding extensive views over the Estrelle on the one side, and Nice on the other. It is erected in granite quarried on the spot, with dressings of white stone from Arles, the whole lined with brick. The roof is constructed with rolled iron joists 3ft. apart, hollow brick arches between, over which is a layer of concrete and an asphalt flat, the ceiling joists below being kept a few inches under the iron work, forming an air space between. The total cost of the building, exclusive of terraces, was £4,200. The work was designed and carried out under the superintendence of Mr. T. T. Smith, architect, 33, Bloomsbury-square.

## ST. TROPHIME, ARLES.

The south walk of this cloister, part of which is shown in the illustration, is said to be of the thirteenth century. (It certainly appeared to me later.) The western walk is of the same date, but somewhat different in design, having eight bays all alike, and of two arches each. The effect of the niches projecting from the piers is, in perspective, very fine; unfortunately, they only twice appear perfect, the S.W. angle being very bald in effect, and a large wall being at the S.E. angle, which is Romanesque work, as are the two remaining sides of the cloister. It is curious to remark the difference of spirit in which the later builders have approached the work of their predecessors, here and at Elne. At the latter place the Romanesque cloister has also been greatly rebuilt in the fourteenth century, but in place of an altogether new design, the restorers copied the whole work as exactly as they could, and it is only in the

base mouldings and in the carving that the difference in date can be detected; while here, at Arles, we see the two later sides in every way dissimilar to the two more ancient. These latter are each of four bays, each bay having four arches. The magnificent doorway of St. Trophime (a drawing of which was published in a recent number of the BUILDING NEWS) was built in 1154, and there is an inscription in the west wall of the cloister that tells us that PONCIUS: REBOLLI: SACERDOS: ET: CANONICUS: REGULARIS: ET: OPERARI: ECCLESIE: SANCTI: TROPHIMI: died on the VII: KL: JANUARI: 1183. Here then we have the name of one who may have been the director or even the designer of this grand work, and I think the fact sufficiently interesting to excuse this digression from the cloister itself. F. C. D.

## EAST MASKALLS, LINFIELD, SUSSEX.

East Maskalls is about a mile and a half from Linfield village street and Parish Church, and is situated in a most charming country. Formerly, it belonged to a family of the name it bears, and was owned in the seventeenth century by a branch of the Newtons, of Southover, near Lewes, from whom it descended to the Noyes, and is now, I believe, in the possession of the Catt family. For a long time it was tenanted by cottagers, but has fallen into such a dilapidated state that it is now altogether disused. The house is constructed of timber framing, filled in with brickwork and plastered. The main entrance is by a porch, as shown in the view, which leads immediately into the large hall or chief room of the house. The staircase is constructed of solid oak steps, and leads out of the large hall. The arms of the Newtons in painted glass were formerly in the windows; all traces of these, however, are now gone, and the windows are mostly broken, and in many instances built up. Sir Isaac Newton is supposed to have been connected with this family. The several details herewith given include most that is interesting in the mansion to the architect. The fire dogs shown are wholly conjectural.

MAURICE B. ADAMS.

## LODGE, HODSACK PARK, NOTTINGHAMSHIRE.

This lodge was designed for the late E. Chaloner, Esq., and as it was for a subordinate entrance, was by his request kept small and simple in outline—a special instruction being that there should be only one stack of chimneys, and that in the centre of the building. Mr. S. J. Nicholl, of 1, Caversham-road, N.W., is the architect.

## SCHOOLS OF ART.

CHELTENHAM.—The annual distribution of prizes to the students of the Cheltenham School of Art, took place on Monday week, the President, Dr. Wright, F.R.S., in the chair, who said: "An early pupil and assistant of our school has become a successful exhibitor of the Royal Academy, and is now one of the rising water-colour artists of our day. Another assistant has qualified as an Art-master, and is now the head-master of the School of Art at Derby, with another pupil, his assistant. The Derby school numbers 331 pupils. Another of our pupils is acting as assistant-master at Reading, with 139 pupils under instruction. Another pupil has obtained an Art-master's certificate since leaving, and become head-master of Mansfield School of Art. I hold in my hand an original design on vellum for a fan, the admirable etching for which was selected for national competition, and was the production of the pencil of Miss Amelia Ridge, to whom I have great pleasure in handing the certificate for her beautiful drawing." Dr. Wright then distributed the prizes, and the proceedings ended with a complimentary vote of thanks to Mr. Knight, the head-master of the school.

CITY AND SPITALFIELDS SCHOOL OF ART.—On Monday night Lord Henry Lennox, M.P., First Commissioner of Works, distributed the prizes to the successful students of this school of art, at the school, Primrose-street, Bishopsgate. Lord Henry Lennox said he was happy to find himself at the East-end, as he had joined with Sir Antonio Brady in promoting the Bethnal-green Museum. That museum had been very successful. He was quite sure that when the students of art schools such as this went to that museum, and saw the varied and vast treasures of art collected together, they carried still further the education commenced in these schools. He congratulated the school on its removal to such commodious buildings, and although it had made good progress, they must endeavour to improve until they could take the position they ought to amongst schools of art. They lived in an art neighbourhood, for Spitalfields was the seat of the great silk manufactures brought over from France. The original weavers had the art and taste common to the French nation, and he should be sorry to find that the present inhabitants, when art training was so much to be desired and sought after, should fall behind their predecessors in the race. He trusted, therefore, that they would make rapid progress during the next year. His lordship then proceeded to distribute the prizes. Mr. Durham, A.R.A., then addressed the meeting, and urged upon them to cultivate art with care and painstaking. Mr. Hill, the secretary, presented a handsome testimonial, consisting of a marble timepiece and two vases, to Mr. Mills, the teacher, who acknowledged the gift in suitable terms.

OXFORD.—The annual meeting of the Oxford School of Art took place on Saturday week, Dr. Ackland, F.R.S., presiding. According to the report, the number of persons who attended the Art Classes and received instruction in drawing during the Session ended 31st July, 1874, was 109. The average attendance during the 10 months of the session was about 57; the number presenting themselves for examination was 100 (last year 87). These 100 candidates gained in all 140 successes at the examinations in May last, 16 in the advanced stage, and 124 in the elementary stage.

SALISBURY.—On Thursday week the ninth annual meeting was held of the Salisbury School of Art. The report stated that both as regards the progress and success of the students, the number which attended the classes, and the finances of the school, there never had been in any previous year so much cause for congratulation as at present, one of the students having achieved the honour of carrying off one of the nine gold medals, another one of the twenty-five silver medals, and a third a national book prize, awarded by the South Kensington authorities amongst the 123 schools in the United Kingdom.

SOUTHAMPTON.—The annual distribution of prizes to the students of the Southampton School of Art took place on Friday last. According to the annual report the attendances during the year have been: morning classes, 18 students; afternoon, 86; evening, 66; life, 5; making a total of 175 students, and showing an increase of 19 over the previous year. 89 of the students sent up 652 works to the annual examination in London; five of these were selected by the examiners for national competition, and nine third grade prizes were awarded. The annual second grade examination was held in May last, when 91 students presented themselves, several of these being from private schools in the town and neighbourhood. They worked 72 papers successfully, 10 obtained prizes for excellence, and two full certificates for having passed in all the subjects of the second grade. 40 students passed in freehand drawing, six in geometry, four in perspective, and 20 in model drawing, showing a considerable increase over the numbers of the previous year.

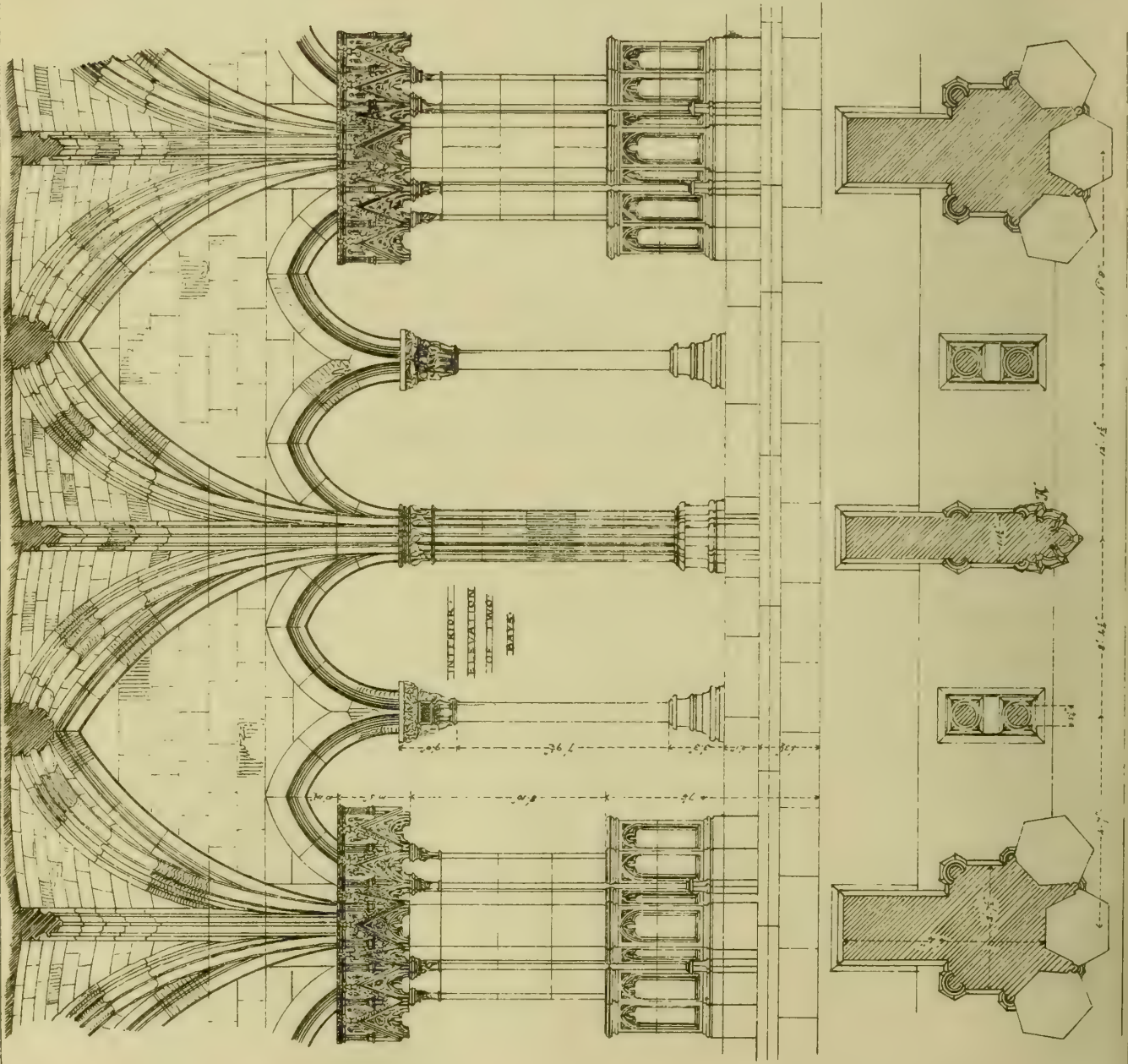
A magnificent reredos is being erected at St. Augustine's Church, Kilburn, under the supervision of Mr. Pearson, the architect. The cost is £1,300. The opening ceremony will take place on the 22nd instant.







*St. Trophime, Arles.  
South-Walk of Cloister.*







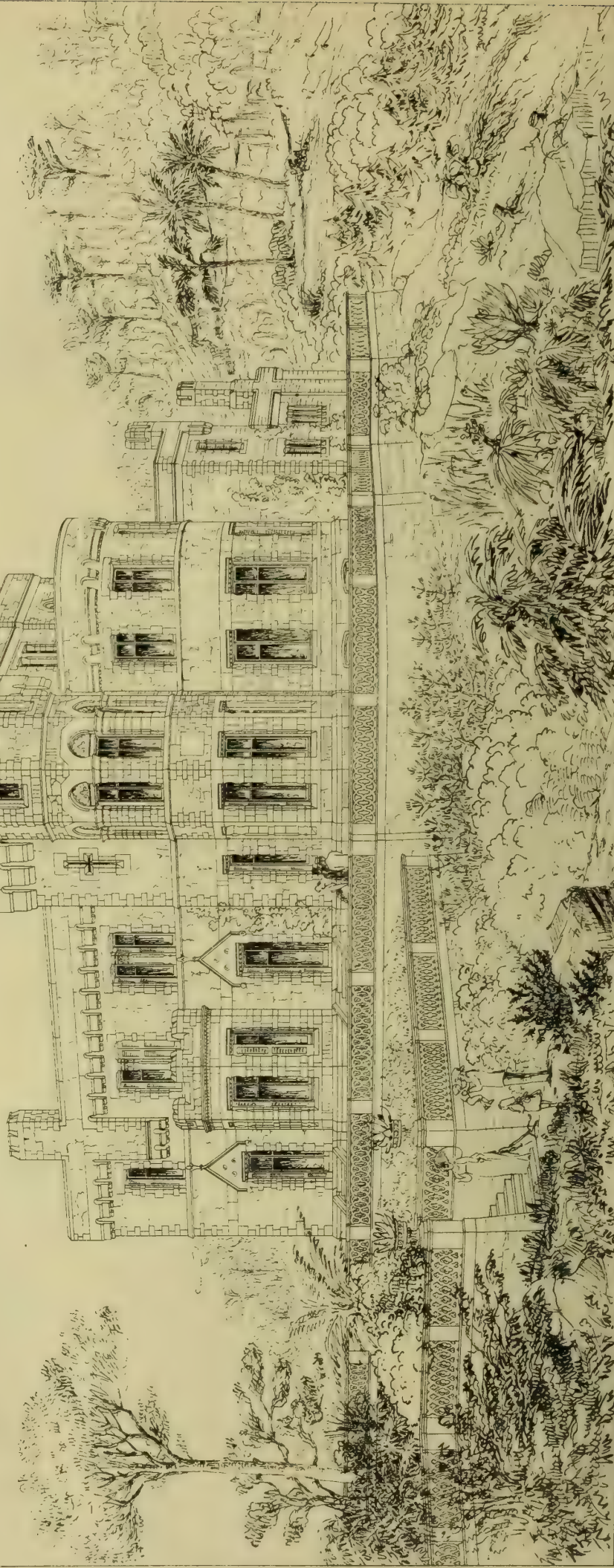




. GROUND PLAN .



. 1<sup>ST</sup>. FLOOR PLAN.

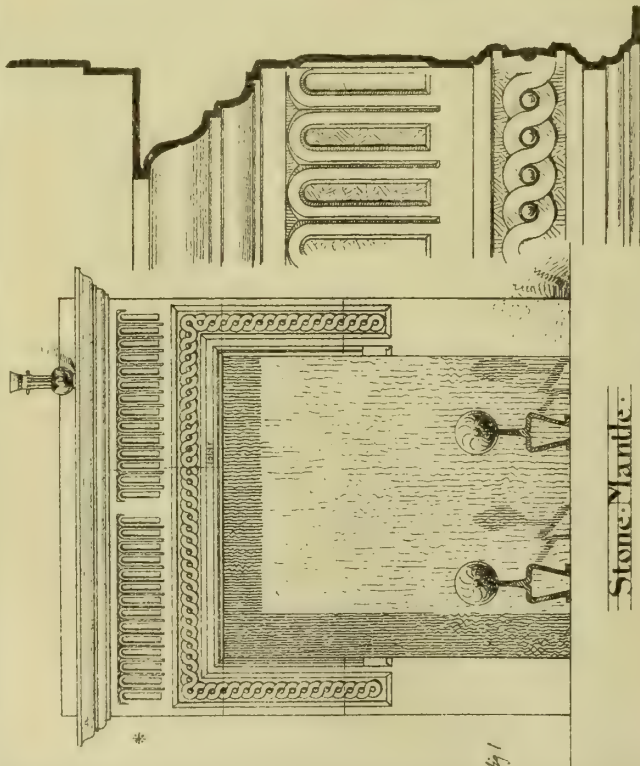
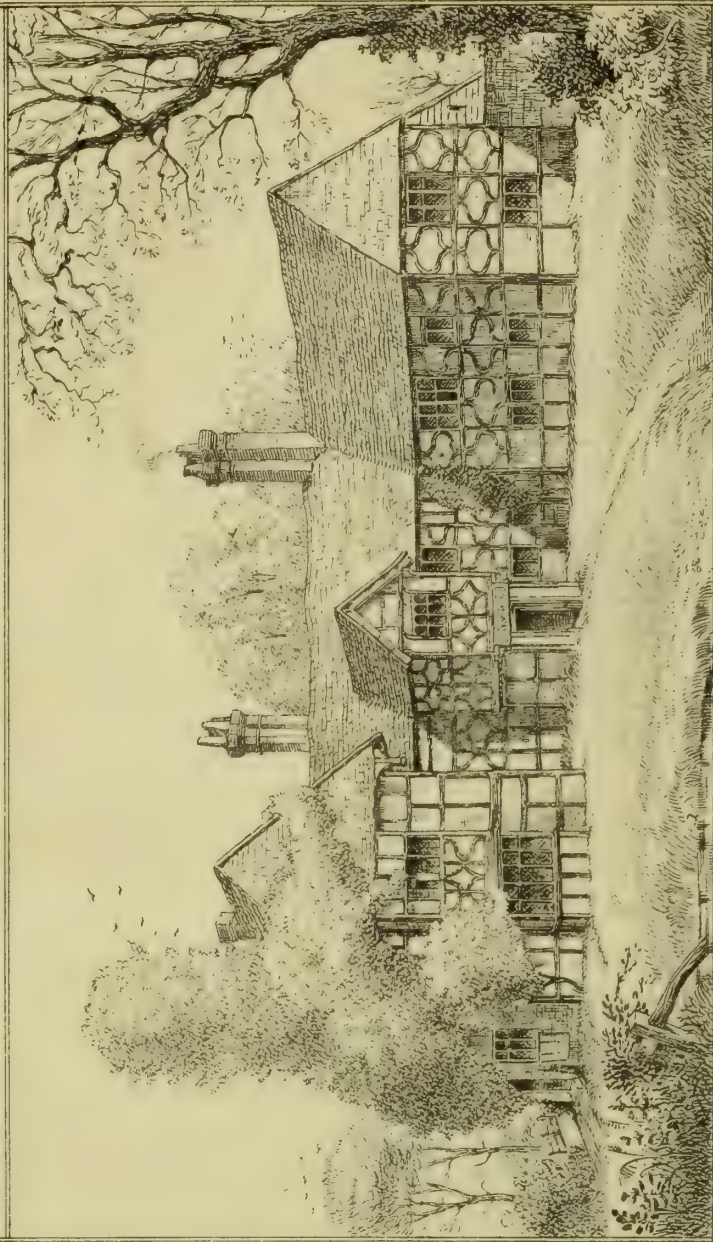








# East Maskalls: near Lindfield: Sussex: view & details



Stone Mantle



Cornice # fig 7



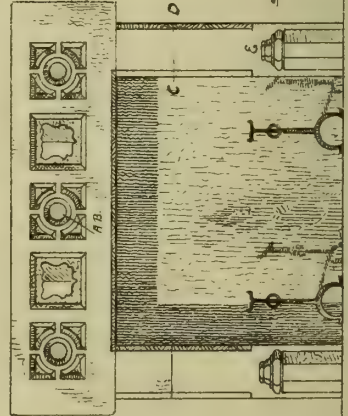
Section A. B. fig 6

Pattern in Joints of Brick

Section C. D. fig 5

base of Chimney

fig 2.

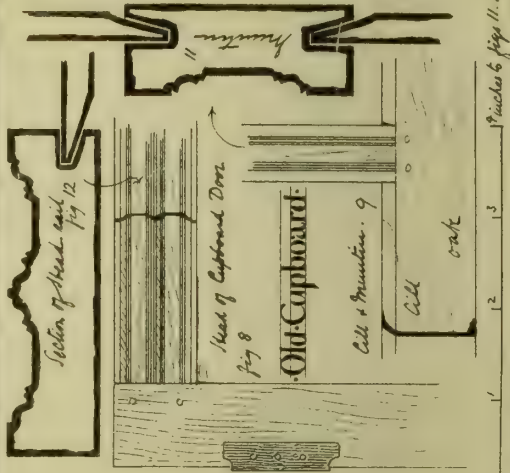


Section E

Stone mantle

5 ft high 12.3.

DESIGNED AND DRAWN BY MADRICE GRADINS ESTER MONROY W.



Porch doorway fig 3

Fig 12

Fig 8

Fig 9

Fig 11

Fig 12

Fig 13

Fig 14

Fig 15

Fig 16

Fig 17

Fig 18

Fig 19

Fig 20

Fig 21

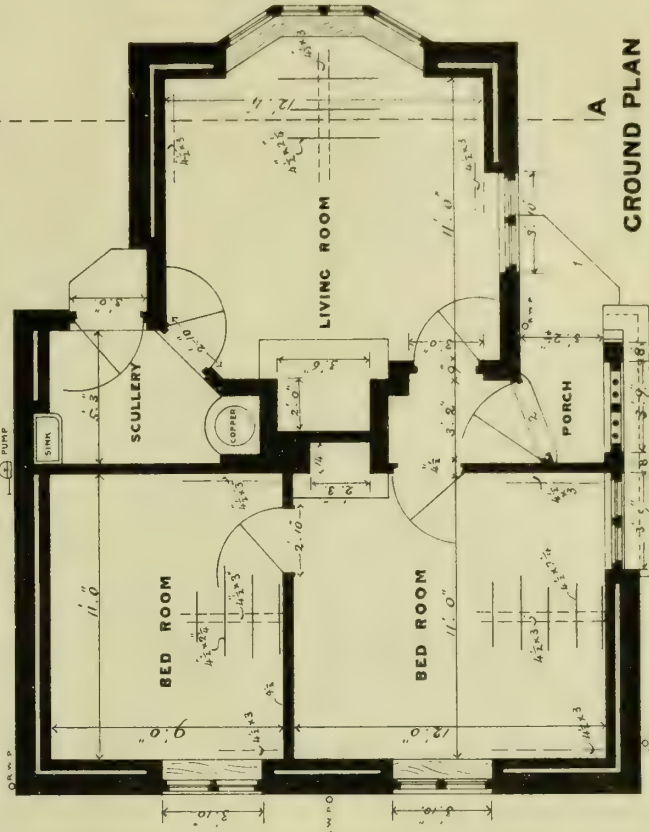
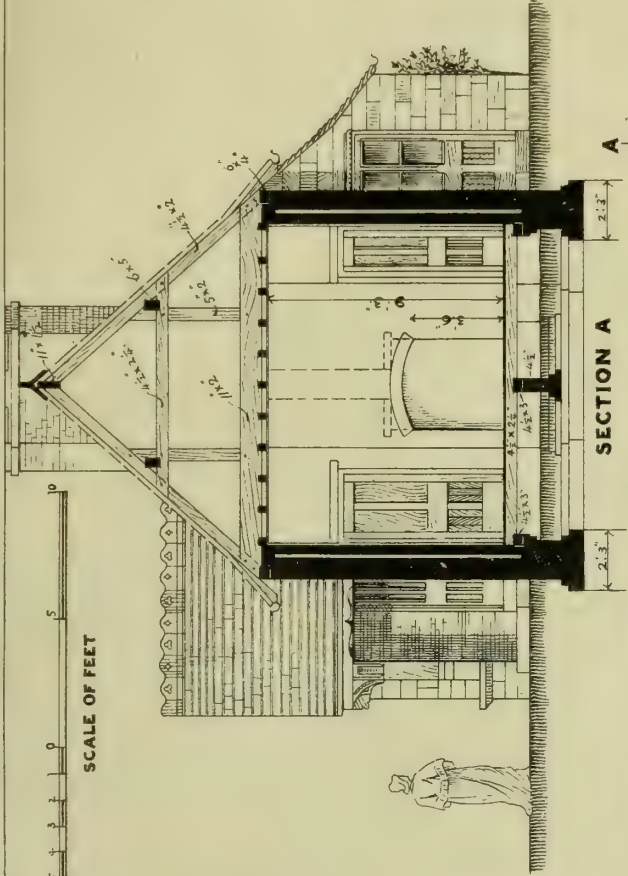
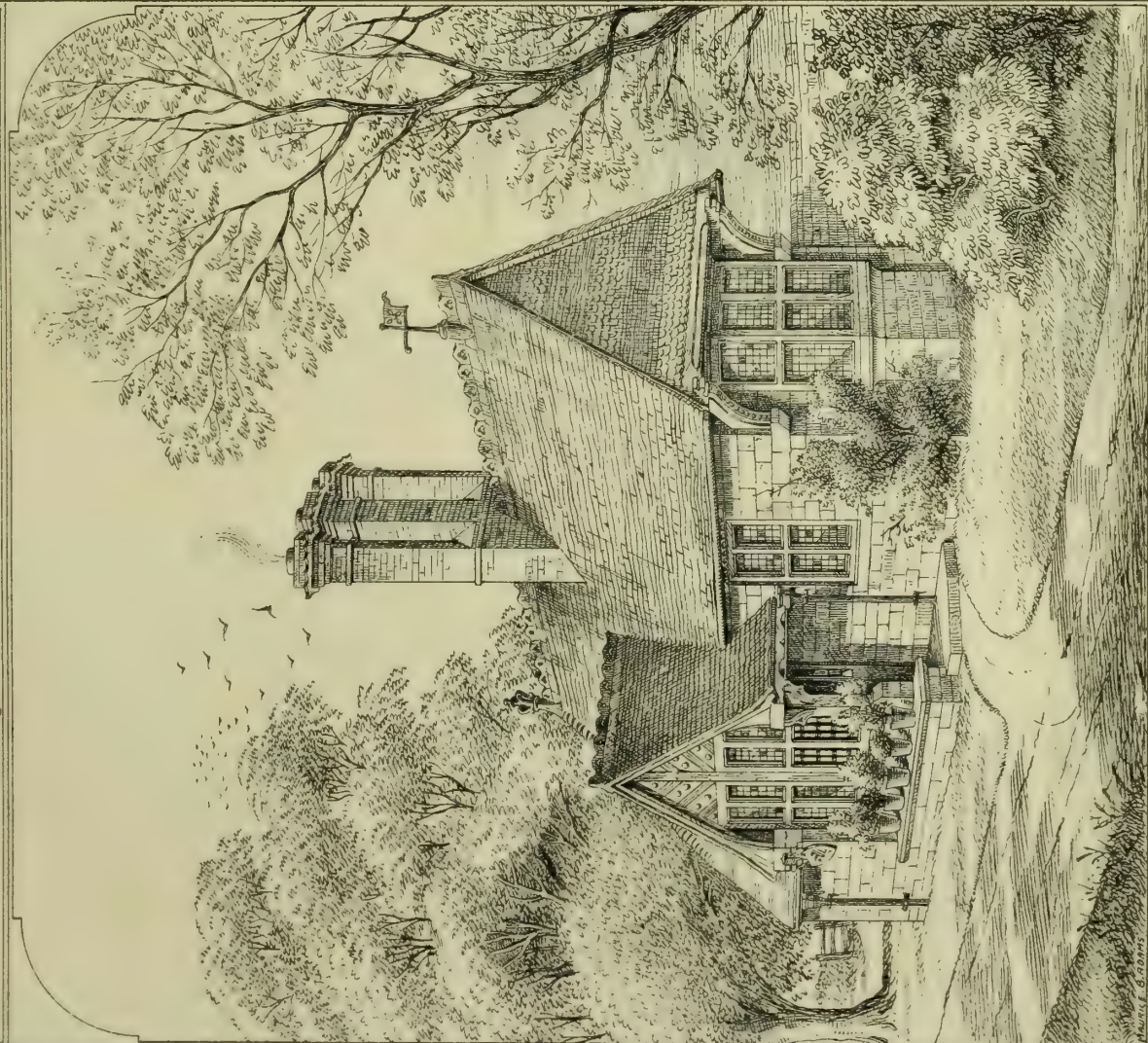
Fig 22

Fig 23

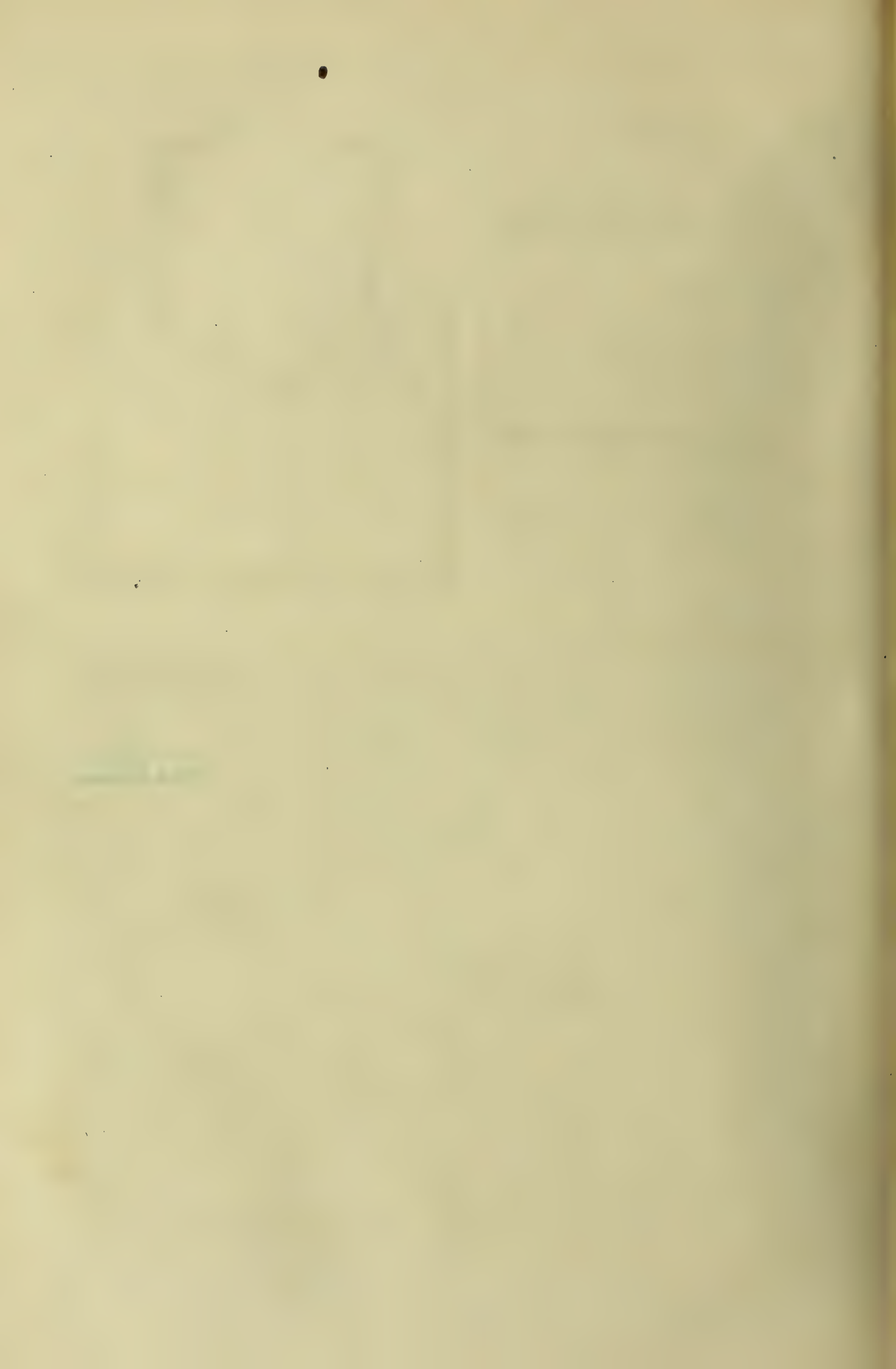
Fig 24



Hodsack Park Lodge, Nottinghamshire. View & Plan.  
S. J. Nicholl, Architect, Caversham Road, N.

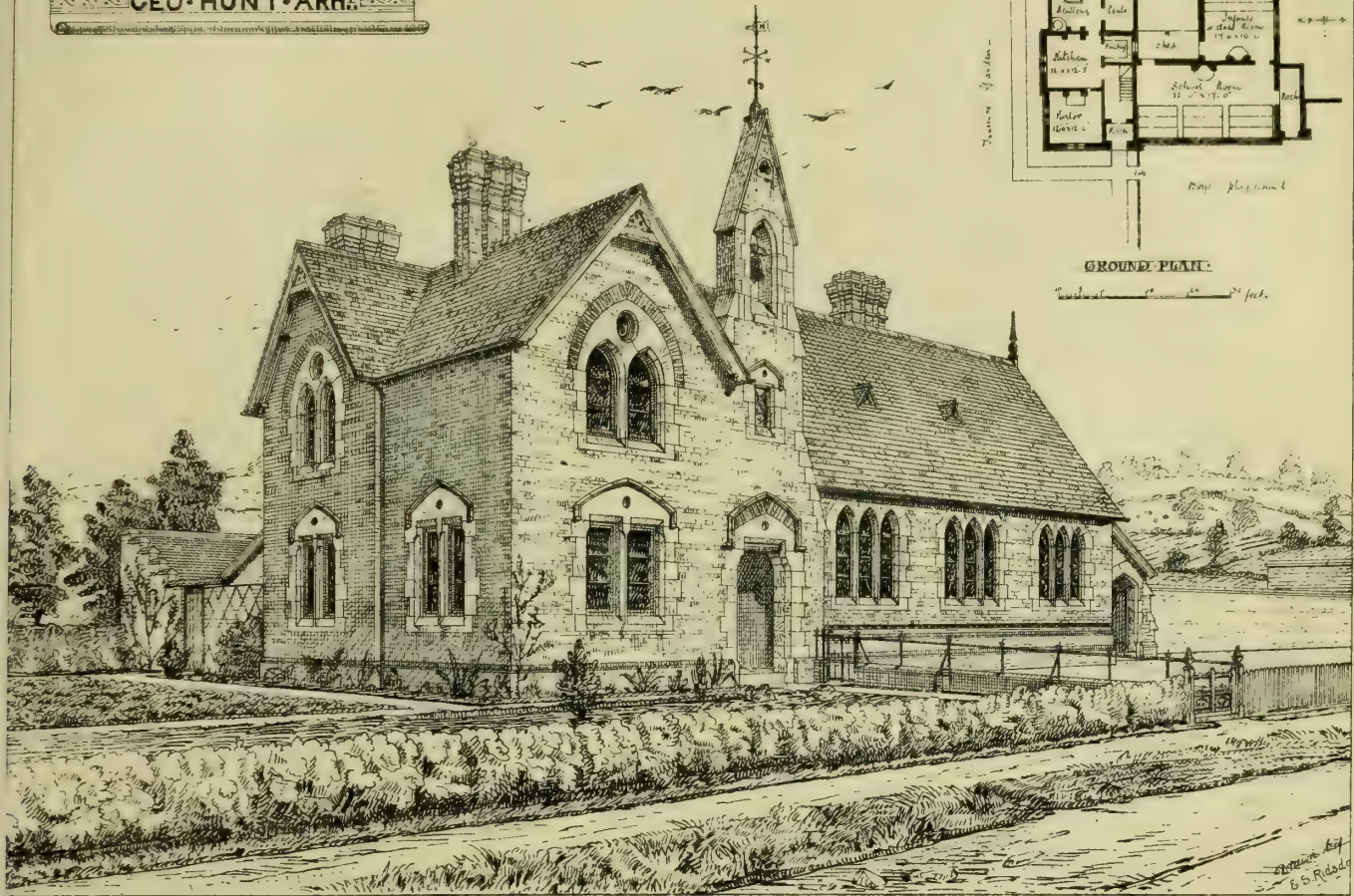
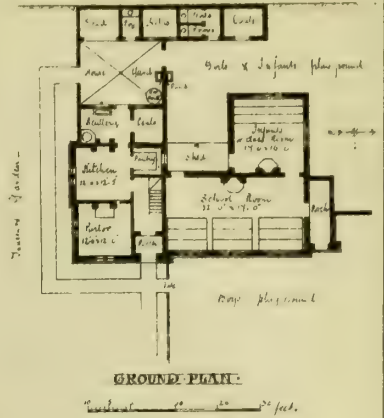




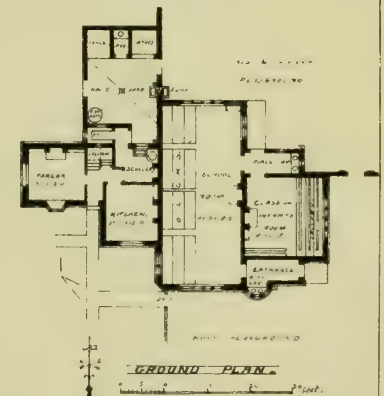




VILLAGE · SCHOOL  
NORTON  
EVESHAM  
GEO · HUNT · ARCHT.



VILLAGE · SCHOOL  
HAMPTON  
EVESHAM  
GEO · HUNT · ARCHT.

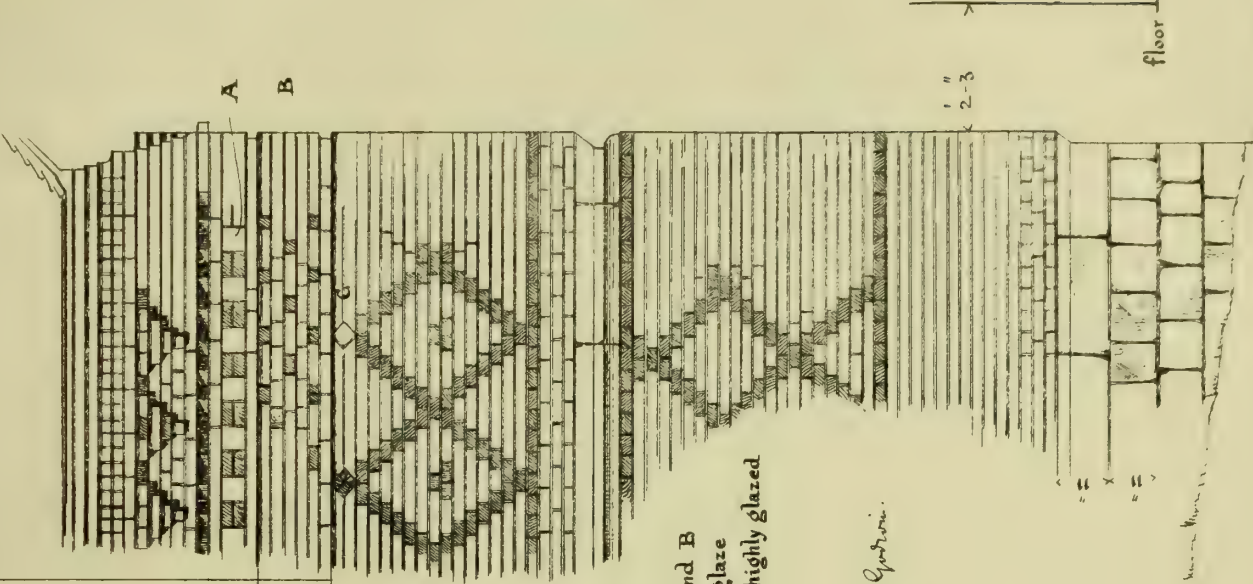
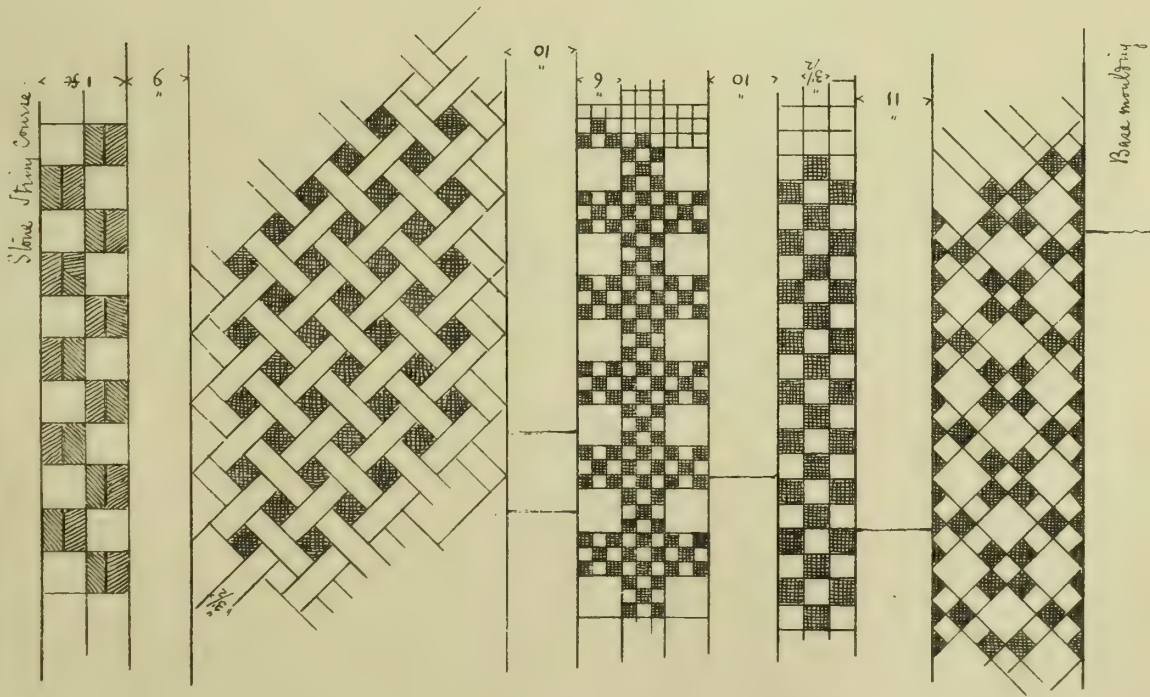






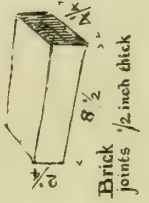


Ancourt Church flint & granite.



Pigeon house Offranville  
Circumference 8' 2"-9"  
All the dark brick except in band B  
are nearly black with a slight glaze  
In band B they are chocolate highly glazed  
C. Lozenge of stone.  
A. Cream-colour stone

Measured & drawn by E. W. Godwin.









## ARCHITECTURE AND LANDSCAPE.\*

(Concluded from page 648.)

**B**UILDINGS on a flat and undiversified plain present little for remark, as the architecture in such a case has it all its own way, so to say, and the only thing to be observed in relation to the nature of the site is to take care that the building has sufficiently elevated features to compensate for the low level of the site and the want of a position of vantage to see it from, and to enable it to be seen at a considerable distance. This is in regard to a wide plain out of the neighbourhood of mountains, but in a low site surrounded by hills, the case is different. A certain elevation is still necessary, but it is useless for the architect to think of competing with the mountains, though I know one or two cases where this has manifestly been attempted (in regard to massiveness of scale and general proportionate size, I mean), and his best chance of a pleasing effect in such a site is to accept the humble position in which he finds himself in regard to nature, and to give to his building that appearance of simplicity and repose which will cause its position of retirement under the shadow of the protecting hill to appear perfectly natural and suitable. In the case, again, of a country neither absolutely flat nor bordered by hills, but varied by tolerably uniform and gentle undulations, a long, horizontal treatment of building will be effective, as affording a kind of definite line for the eye to rest upon amid the waving and uncertain contour of the landscape. This I think it is which gives a charm and a suitability to such a symmetrical and horizontal building as the Villa Albani, backed as it is by an undulating country of no particularly marked character in one respect or another. The combination of architecture with a wooded country seems a more complicated matter for consideration than the two previous conditions; partly, perhaps, because we are accustomed to associate with trees such a multitudinous idea both in regard to the number of species and the endlessly varying lines and breaks of contour which they produce. Yet by one of the most respectable authorities on such subjects, the matter is condensed into a very few words. Repton, in his work on landscape gardening, says that from a landscape gardener's point of view, there are only two styles of architecture—the Horizontal and the Perpendicular, or Grecian and Gothic; unless, he adds, "we may assume a third under the head of the 'fantastic,' or, as it may be called, the Chinese." The worthy gentleman means what we should now call "tea-garden" architecture, still preserved in many of our parks. His views about architecture, if we consider them in detail, are certainly old-fashioned, but there is plenty of good sense and good taste in Repton, and many of his suggestions are very well worth considering in the present day. Proceeding with his simplification theory, he classes trees also in two main divisions—the round and the pointed. As to the relation between these and the two styles of architecture, he is of opinion that "trees of a pointed or conic shape have beautiful effect with Grecian architecture; though an association with the ideas of Italian paintings, where we often see Grecian buildings with firs and cypresses, may also have some influence on the mind." There is no doubt that association of this kind does influence us very much in such matters; so much so that it is not easy always to discriminate between the result of association and that of unbiassed judgment. But I am inclined to think Repton's decision is a perfectly reasonable one, and that trees of a vertical tendency and of a tolerably symmetrical character of growth do blend well with a horizontal building. At all events, I think it quite clear that they do not go well with a vertical one; they confuse and weaken its effect; Repton's necessary conclusion is, of course, that Gothic buildings go with round forms of trees, because he says "they have a varied skyline, and hence are peculiarly suited to sites where the shape of the ground hides the lower part of the building, while its roots are relieved by trees whose forms contrast with those of Gothic outline." We do not in the present day (at least, I hope very few of us) go about dropping a Grecian building into the country here and a Gothic one there, just as fancy and the nature of the site may determine; but in their essential meaning these remarks, if true, are as true now as when they were written.

Further on, we find sentiments on the subject of combination of the house with landscape which are quite refreshing: "When the lawns, the woods, and the water, and the general face of the surrounding country are on so extensive a scale, the only means of preserving the same characteristics is by extending the plan of the house also; and how can this be effected unless we adopt the Gothic style of architecture? In Grecian or modern buildings it has been considered an essential part of the plan to conceal all the subordinate appendages of the mansion. Gothic enables us to use these in extending the design." Now though Repton's notion of Gothic would probably horrify most of us, yet there is excellent sense and true perception of architectural treatment in this. Repton illustrates this by the view of Bayham, in which he points out how the size and extent of the buildings, which are formed round a large quadrangle, are clearly traceable through the contours of the foliage, and thus the idea of largeness and extent is conveyed which could never have been obtained had the house been combined into a single block, and the offices planted out of sight. Indeed, upon this system, formerly so universal, and still practised to a great extent, of planting the offices out of sight, Repton is sarcastic, saying that he has often been required to plant trees for this purpose, which during the lifetime of the architect and the owner never do conceal the offices, and which, in the lives of their successors, always have to be cut down to give a free circulation of air to the buildings. One other remark is worth quoting, viz., that "no form of building, as a rule, looks so insignificant in a landscape, in proportion to its actual size, as a cube," a fact which I have had occasion to verify myself, and which is owing to that form presenting nothing to lead the eye in any one direction of length, breadth, or height. He adds very pithily that "symmetry may make an extensive building look small; irregularity will make a small building look large." In referring to Repton, I have purposely avoided alluding to anything connected with landscape gardening, which is the main subject of his work, because my object in this paper was to speak of architecture only in its connection with natural landscape in its widest sense. But I would advise those interested in the matter to look up Repton; allowing for the difference in architectural insight and knowledge in his day, they will find a great deal that is both sensible and suggestive. He was the acknowledged authority in his own day; and one of the most amusing chapters in Jane Austen's best story, "Mansfield Park," describes a dinner-table discussion as to the beautifying of a mansion and grounds, in which "Mr. Repton" is referred to as constituting the court of final appeal. The principles he advocates, and which in the main, I think, are correct, would lead, however, to the conclusion that Greek architecture cannot well be assimilated with rounded and irregular foliage forms, which I should scarcely adopt; indeed, I must confess that I never see the open colonnades in Hyde Park gates, and the trees in the park through them, without being pleased with the effect; and here, I think, is again the condition of contrast of line; the symmetrical grace of the Greek "order" with the unsymmetrical grace of the living foliage. As a combination of another kind may be noted the effect of the large heavy dark forms of the yew trees in Hampton Court Gardens, with the palace as a background. The trees might have a better architectural background (with all deference to Mr. Stevenson), but the general effect is the same, and may stand as an illustration of the combination of conical trees with a heavy mass of horizontal architecture; the cone form is not acute or strongly marked, to be sure, but the character of the foliage is spiky, not rounded. The question as to the character of trees which ally themselves best with a building, however, really depends very much on whether we consider it in regard to natural scenery, or to the formation of an artificial garden effect. In the latter case the trees are planted in some more or less symmetrical relation to the building, and really become a portion of the architectural effect; and perhaps Hampton Court comes more under this category. If we consider architecture in its relation to the sea and to sea-coast effect, there cannot be a shadow of a doubt to what form or expression in building the aim of the architect should be directed. In all our associations the sea is connected with ideas of power, grandeur, or of a desolating fury of the elements; and in many of the finest coast scenes the facts tally with the associations for a considerable part of the year at least. The

whole expression of a building to face the sea should be one of stern power and solidity. It should have the air of being rooted and buttressed in the rock beyond all fear of being shaken or threatened by the invasion of the winds and waves. To my thinking, the architect could hardly have a commission more calculated to stimulate his enthusiasm for the more poetical side of his profession, than the command to place upon a site overlooking the open ocean a building which should be in keeping with such a position. All the grander and more monumental effects of architecture, which modern life seldom gives occasion for, and even scorns as involving useless expenditure, are here not only permissible to him, but are actually the required elements of success in his undertaking. He has a right, by the very conditions of the problem, to be liberal in the thickness and massiveness of his masonry, to discard all prettiness and trivial ornamentation, to reduce the area of his window openings, to give to his walls that broad expanse of solid stone which shall seem as impervious to all buffeting of the wind laden with the salt sea spray as is the rock itself; he has to realise the fine line of the Poet Laureate where he likens one of his heroes to a tower—

"That stood four-square to all the winds that blew."

The painters are emphatically with us on this point. Look at the buildings which Turner seeks for to heighten the effect of some wild tempestuous coast scene, as in the one from Pembroke Castle. Imagine for a moment the outlines of Eton College, which (though not much in the way of architecture, strictly judged) plays its part so pleasingly as an ingredient in one of his quiet river scenes on the Thames—imagine it transferred to the scene of Pembroke Castle. The impression is that it would be gone in a moment. It is vexatious to think that (partly owing, I suppose, to the nomadic or intermittent nature of seaside populations) seaside architecture in general is marked by so exactly the reverse of the characteristics I have endeavoured to describe—that seaside houses are commonly the type of all that is sham and rickety—and that on a visit to any place renowned for its fine coast scenery, where there are not old remains, the certainty (almost) is that the only building we shall find there in keeping with the feeling of the scenery will be the lighthouse. In inland sites water is a most valuable assistant and adjunct to architecture, lighting it up and reflecting its features under new conditions of tone and shading; so much so, that I have sometimes wondered that more frequent effort has not been made to bring artificial water into sufficiently close combination with building to produce a united effect as one composition. Of course sanitary considerations come in here, which often interfere sadly with the picturesque. We cannot very well erect buildings in the middle of a stream, but how picturesque they might be when so treated we may gather from the instance of Pfalz Castle. River banks, however, are not in any sense unsatisfactory architectural sites (unless very low), and there is something very pleasing and suggestive in seeing the course of a river marked by the varied outlines of successive buildings on its banks. In the case of merely ornamental architecture, monuments, &c., a combination with water might be often resorted to with great effect, as in the case of the monument in the centre of the circular water in Bushy Park, which is a trumpery thing in itself, but which, as I saw it the other day, completely reflected in calm water, backed by the splendid rich autumn tints of the trees repeated in the reflection, contributed to an effect which was worth remembering. No architectural object plays so important a part in landscape as a tower. In a flat country it is invaluable as an addition to the landscape, and is itself then in the most favourable situation for effect. But it is not ineffective in the neighbourhood of hills, provided these are not so near or on so large a scale as to dwarf it. Turner, in his "Salisbury," gives great effect to the spire by taking a view which causes it just to break the line of the hill behind, evidently with intention; and in his remarkably effective view of Harflur, the great spire, white in the light, is rather aided in effect than otherwise by the sloping lines of the hills to the right. These and other instances in Turner would suggest that, under such conditions, a tower and spire should be so placed that from the best point for a view of them they should appear to overtop the hills, and break upon the sky. In speaking of towers, it may be noticed that Claude, in his

\* By Mr. H. H. STATHAM. Read before the Architectural Association, Nov. 20, 1874.



architectural subjects, almost always places in some part of his picture a plain, heavy, round tower as a kind of foil or contrast to his columnar or Renaissance architecture. Turner seeks for contrast in his tower subjects, but he seeks for it in light and shadow; and where he has two objects of this kind of about the same size and importance he almost always puts one of them in light and the other in shadow. The sketch in the "Liber Studiorum" from the Greenwich picture, and the two spires in "Coventry," are instances of this. Since it became my fortune to live almost, I may say, under the towers of Westminster, I have been constantly struck with the beauty of this effect; these two towers at either end of the Westminster Palace seem to have all kinds of expressions as different lights fall on them; and you may step out and find the Victoria tower clad in purple and fine gold, resplendent and glowing, while the clock tower wears an almost threatening aspect; then a moment after, and behold! the scene is changed, and the clock-tower is all glitter, and its prouder neighbour has relaxed into gloom. If, then, the aspiring architect has the rare good fortune of having to erect anything large enough to have two towers, keep them sufficiently apart to afford room for this varied play of Heaven's light upon them, this constant poetry of architectural expression. I cannot quit this subject without remarking on the interest and charm of the various views of the Victoria Tower which you get in coming down the Thames from Putney or Chelsea. It is worth while to go a little way up the river to watch the effect of this tower as you come down again, and the varied aspects and perspective positions which it assumes. Few things in architectural effect are more striking than the use made of towers in the Mediæval French châteaux, where the dwelling part of the château is placed on a high rock or plateau, and the tower seems to plant a foot on the ground below, as if as a sentinel. Any one who examined the French Commission drawings in the International Exhibition must have been struck with the prevalence of this arrangement, and its remarkable effect upon architectural expression as well as on plan and construction. Turner was evidently taken with it, as his view of Château d'Amboise indicates. In such a case, too, the almost rocky sternness and bare aspect of the tower forms the connecting link between the dwelling and the landscape. In modern mansions there are gentler methods of effecting this desirable object. Sir Charles Barry attached great importance to this gradual connection of the house with the landscape by extending its base, so to speak. The description of the way in which this was effected at Trentham Hall, in Staffordshire, under great disadvantages, always pleased me very much. Canon Barry (in his life of Sir Charles) says: "The hall was surrounded by lawns and paddocks, reaching down to a lake. These were converted into a succession of gardens of regular design stepping down by terraces from the house to the lake, and by balustrades, vases, statues, and flights of steps, so connected with the architecture of the house as to spread out its base, and give it the dignity and apparent height which its natural position forbade." A connection with the landscape may be formed even by other buildings around the principal one, and repeating to some extent its lines. The view of the Villa Caprarola, from Percier and Fontaine's book, seems to me an illustration of this. I call that a remarkably fine and homogeneous composition; and it is so partly owing to the repetition of the horizontal lines and square forms of the principal edifice by the succession of smaller buildings stepped down the rock, and without which the contrast between the remarkably square symmetrical form of the villa, and the rough rocky character of the site, would be somewhat too rough and abrupt a transition. The way that a building leaves the ground is not without effect on its expression; and this may be noticed in two extracts from Mr. Billing's book on the "Baronial Antiquities of Scotland." Borthwick Castle is a notable instance of the effect that squareness and mass may produce in a barren district and rising from broken ground; but Udney Castle, a building of much the same characteristics, rising from a smooth lawn with a background of trees, seems quite out of place—a mere excrescence unfitted to the scene. As an instance of the poetic effect to be derived from a rude old building, treated in harmony with the landscape, I would instance a fine painting by Millet, called "The Old Stone House," in the

Exhibition of the Society of French Artists, New Bond-street. The part which buildings play in giving scale to the distance in a landscape is very important, and if the architect has any regard for the effect of his building on the scenery, he should endeavour to give it an outline and proportion which will harmonise with the scale of the landscape, and to place it so as to afford an opportunity for assisting perspective effect. An instance of the value of a building in regard to this latter point is seen in a study by Claude, where a small building on the distant plains, evidently by its outline a building of the same class and size as that near the foreground, contributes largely towards increasing the scale and effect of the distance. The question of colour and tone is important, too, in its effect in connection with landscape. In the course of the expedition of this Association into Northamptonshire, we visited a place called West Deeping, where there was a quiet old brown stone church of not very remarkable interest. At all events it did not tempt me into sketching, and I strolled round to look into the water rushing through the milldam, and in so doing opened out a view of a brand-new parsonage behind the old church, all red, black, and yellow brick, tuck-pointed and everything proper. I think a general means of avoiding such harsh and crude effects is to aim at employing as much as possible the building materials of the district, because these are what form the basis of the tone of the landscape, and, though any new building looks raw and crude at first in the landscape, it will, if built of a material indigenous to the district, very soon begin to assume a harmonising tone. Not, however, that I would by any means speak slightly of brick as a picturesque material, but I confess to an absolute hatred of the buff and yellow brick. It harmonises with nothing; it is gaudy when new, and insipid and toneless when weatherworn. But a rich-toned, not too-bright red brick looks very well, especially in combination with a well-wooded country. I noticed an observation in Repton that a large red house is not displeasing, though he seems to think a small one is. I was struck with this, having observed in the Architectural Room of the Academy, the last two or three years, a tendency towards large red houses; and one I remember very well, though I forget the architect, where the red tone was carried in an almost uniform tint over the roofs, also by means of tiles; the site was well wooded close up to the house, and the effect, as shown in the water-colour drawing, was exceedingly pleasing. As to small houses, most of us remember the red house at Northampton. There is something also to be said for white in a landscape, where grace rather than richness is the prevailing character. You will perhaps think I am naming rather a trivial instance, but in walking up St. James's Park, on some recent autumn mornings, I have been much pleased by the effect of the long white front of Carlton-terrace glittering in the sunlight and seen through a network of thinly-clad trees. It would be pleasant to think it was marble, no doubt, but let composition have a good word for once. This kind of combination with pure white building was liked by Turner, who gives a fine instance of it in his imaginary scene called "The Garden of Boccaccio," in the National Gallery. There is another point on which I should wish to raise a question, and that is in regard to a very prevalent and increasing disposition on the part of some of the ablest members of our profession, who, again, are imitated by their juniors, towards what can only be described as more or less a "rustic" style for large country houses. Some of the compositions of this kind, seen from time to time in exhibitions and in the illustrations of the architectural journals, are so picturesque in themselves, and are, in the best instances, set forth by such capital and artistically-effective drawing, that the judgment is disarmed on looking at them. Yet it is open to serious question whether this is, after all, the thing. In the first place, it may be doubted whether the comparative refinement and culture of modern life, in regard to which there is now little real distinction between the country and the town, meets with the best architectural expression in a building conveying the impression of being a group of cottages thrown together into a house, with a turret added as a leading feature. Then in regard to the connection of the house with the landscape. I used the word "picturesque" in regard to this style of house, and it is so; but it seems to aim at including all the picturesque within itself, and preventing, one might almost say, the aspect

of landscape and house in one. The limited degree of attention I have had to give to the subject goes far to convince me that rustic buildings, except on a small scale and under special circumstances, are not effective in rustic places. The house should distinguish itself from the landscape more, and not seem intended only to imitate the irregularity of nature. It is an artificial thing, and should not lose a certain degree of artifice. On the whole, I cannot but think that it is the architecture of movement that we want most in towns, to give relief and variety to our streets; and the architecture of repose in the country, where the movement and variety are supplied by nature herself. Of late years there has been a great reaction in favour of artistic furniture of every description, and whereas the architect formerly had little or nothing to do with the interior decoration of a building, now, in not a few cases, he takes a certain pride, and his client also, in having everything designed in one style and with relation to the main character of the house. This has led to a great deal more attention to ornamental design, and apparently to a kind of theory in some quarters that such is the real business of the architect. The result is that we sometimes find buildings in which all the internal fittings are admirable, but of which the external design, or what is in strict sense the architecture, is uninteresting or positively ugly. The more the architect has to do with the fittings of his building the better, generally speaking, both for the building and for himself. But do not let him forget the larger and more important part of his task. His carpets and chairs and wall-papers soon decay and are changed, and, in any case, affect only the comparatively few who live in and are entertained in the house. But the exterior, the architectural composition, is in sight of all; he has the whole landscape for the theatre of his art, and his building, if constructed with true monumental stability, is a permanent contribution to the features and expression of the country. Let him treat nature with due reverence, and she will not be slow to second his efforts. She will adorn it with her own rich tints, surround it with her living verdure, pour upon it the magic of her fleeting lights and shadows, and make it a portion of her own everlasting yet ever-changing pageantry.

A short discussion ensued, in which Messrs. Douglass Mathews, H. C. Boyes, Pain, S. F. Clarkson, Jno. Sulman, and the President took part; and a hearty vote of thanks having been given to Mr. Statham for his paper, that gentleman said a few words in acknowledgment, and the meeting terminated.

## THE CONSTRUCTION OF WAREHOUSES AND WORKSHOPS.\*

(Continued from page 621.)

RETURNING to the consideration of the foregoing experiment, and of how much of the depth of 2in. of the carbonised matter that surrounded the story-post at the conclusion of the experiment was due to the action of the second conflagration in which it was immersed, we have already stated our belief that a very slight quantity, if any, of the timber was carbonised or burnt on the second occasion. The post was, as we understand, placed in the yard exactly as it was taken from the site of the first conflagration, without being denuded of the stratum of charcoal with which it was encased by the action of the first fire. In that condition, and in its original upright position, it was surrounded by no less than one ton of shavings and wood. The whole heap, including, of course, the story-post itself, was saturated with petroleum, and a light was applied. What took place then? The petroleum shavings and wood on the outside of the heap, where there was a good supply of air, burnt freely, and created such a large amount of heat and stench as was anything but agreeable to the bystanders. The heat to the leeward must have been enormous for a considerable distance, and the lookers on, or the chief of the staff at any rate, doubted not that the story-post found it still more hot, placed as it was in the centre of the mass of burning matter. Indeed, we have but little doubt but that a portion of the heat that was felt was supposed by them to proceed from the combustion of the post itself. Has any person taken the trouble to explain the fact that by first saturating the charcoal coating with

\* By W. C. HOMERSHAM, C.E., in *Iron*.



petroleum, and then keeping men pumping petroleum and turpentine on it during the time it was in the midst of the fire, the very best means were adopted not to consume the remaining portion or heart of the timber, but to keep it cool? Such was the case. The charcoal, which formed no mean barrier to the passage of the heat of the fire to the heart of the timber, absorbed and retained the petroleum as freely as a sponge. Some small proportion of the petroleum and turpentine that was taken up by the outer layer of charcoal was consumed, but the larger portion, that which found its way to the inner portion of the charcoal, was not burnt but evaporated, the consequence of which was that the heart of the timber, in place of being burnt, was kept cool; aye, so cool, as we are told by the experimenter himself in his letter to the *Times*, that it was just perceptibly warm to the touch, but nothing more. By that letter we also learn that when the stock of petroleum was exhausted turpentine was pumped on. Supposing the gallant captain had gone a little further with his experiment, and pumped on a very large quantity of some of the most volatile oils. Had he then, at the conclusion of the experiment, in place of finding the heart of the timber just perceptibly warm, found it very cold, with an icicle inclosed, would the world have then been informed by the same high official that icicles are absolutely proof against any heat that can be applied to them?

Could any person successfully promulgate such an extraordinary delusion as the unflammability of the most inflammable of woods, so doing might be more dangerous, but hardly less mischievous, than publishing statements immediately contrary to the facts concerning the properties of iron. The architect who should commit an error in construction by adopting such views concerning timber, and be afterwards made to suffer in his pocket as well as reputation, would be deserving of not the slightest amount of commiseration, either public or private; but some slight excuse might be made for an architect falling into an error concerning the properties of iron by taking for granted the statements relating thereto so boldly put forward in "Shaw's Surveys."

On page 16 of that volume it is stated that "In many places there are corner buildings supported by iron columns only, and therefore most dangerous at any temperature below 31deg. or above 100deg. Fahr." No statement could be plainer or bolder; buildings supported on iron become dangerous when the temperature of the iron falls below 31deg. Fahr. or rises above 100deg. Fahr. Fortunately for the public in general, and the Crystal Palace Company in particular, there is not the slightest amount of truth in that bold assertion, as we hope to convince our readers hereafter.

On the following page (17), and again on page 19, attention is called to the well-known fact that iron contracts with the cold and expands with the heat. Of course no objection can be taken to that fact being alluded to, though it is to be regretted that the language used is calculated rather to deter the use of iron in construction altogether than to warn the architect to make the usual and trivial necessary allowance. The first paragraph referred to runs thus:—"Whenever iron is used it must be allowed sufficient play for its elasticity, and also for the expansion and contraction, which it undergoes unceasingly, in consequence of changes in the temperature;" and the second, on page 19: "Wherever iron is used, either for bressummers or in walls, as for beams, joists, &c., proper allowance must be made for its expansion and contraction with changes of temperature. If this is not attended to, serious fractures may be caused in the walls, and sometimes destruction."

The amount of expansion and contraction that iron undergoes unceasingly in "consequence of the changes in the temperature," and for which, as the author of "Shaw's Fire Surveys" somewhat sternly warns his readers, "if the proper allowance be not attended to, serious fractures may be caused in the walls, and sometimes destruction" is, after all, infinitesimal, and the effects thereof are easily and invisibly (except to the professional eye) provided for by the practical engineer. Where would the Crystal Palace, and the two water-towers appertaining thereto, have been now, had there been any real danger, in a properly constructed building of iron, from the effects of expansion and contraction, arising from the changes of temperature? The total length of the Palace is 1,608ft. The Palace is constructed in carcase, almost exclusively, of very

thin castings of iron, in combination with glass, and being exposed at the top of a hill, the changes in the temperature of the iron must be comparatively very great, and exceed by several hundreds per cent. the amount of variation that occurs in iron as usually placed in the construction of warehouses, workshops, &c. The laws relating to the subject have been thoroughly investigated and made known for a very considerable period. Wrought iron contracts and expands 1-143,000th part for each degree Fahr. of decrease or increase of the temperature thereof, and in cast iron the difference is 1-162,000th part for each degree.

From the above data it is found that a wrought-iron girder, fixed at "temperate" (55deg. Fahr.), must have a length of 64ft. 3 $\frac{3}{4}$ in. to cause the amount of contraction at each end to amount to 1-16in., or  $\frac{1}{16}$ in. in total, on the temperature throughout the entire section and length thereof falling to that of melting ice (generally termed the freezing-point), 32deg. Fahr. A girder of cast iron must have a length of no less than 73ft. 4 $\frac{1}{2}$ in. to undergo the same amount of contraction with a similar reduction in its temperature. With a fall of its temperature from temperate to zero, wrought iron contracts  $\frac{1}{16}$ in. in a length of 27ft. 1in., and cast iron  $\frac{1}{16}$ in. in 30ft. 8in. Again, we find that the amount of expansion in wrought iron is equal to  $\frac{1}{16}$ in. in a length of 37ft. 2 $\frac{1}{2}$ in., and in cast iron in a length of 42ft. 2 $\frac{1}{2}$ in., upon the whole mass thereof being increased in temperature from temperate (55deg. Fahr.) to the greatest summer heat in the shade in England, 95deg. Fahr.

The power of absorbing heat is low in iron of both kinds. The temperature of the surface of iron in the shade is usually several degrees below that of the atmosphere, and as the power of conducting heat is always very low in iron, some considerable time must elapse before a sheet of iron, only  $\frac{1}{4}$ in. in thickness, will vary only one degree in temperature from the changes in the temperature of the atmosphere by which it is surrounded. If the difference in the maximum and minimum amount of heat of the mass of iron in a column or girder amounts to as much as 5deg. Fahr. in a day of 24 hours, the contraction and expansion only amounts to  $\frac{1}{16}$ in. in a length of 337ft. 6in. of cast iron, or of 297ft. 11in. of wrought iron.

Such are the facts relating to the amount of contraction and expansion that iron may occasionally undergo in consequence of changes in the temperature thereof. Before leaving this part of the subject it may be as well to state that calculation shows that if a bar be raised from "temperate" to a cherry-red in the dark (750deg. Fahr.), the length thereof is increased at the rate of  $\frac{1}{16}$ in. in 2ft. 1 $\frac{1}{2}$ in., if it be of wrought iron, and at the rate of  $\frac{1}{16}$ in. in 2ft. 5 $\frac{1}{2}$ in., if it be of cast iron.

On page 38 we find it written:—"Wrought iron fuses at a temperature of about 3,000deg. Fahr., and retains a considerable portion of its strength almost to the melting-point." Whereas the real state of the case is that the welding-heat of wrought iron is very considerably higher than the melting-heat of cast iron, and that is, according to Daniell, 3,479deg. Fahr. Some writers set the welding-heat of wrought iron at not less than 21,637deg. Fahr. The strength of wrought iron increases rather than diminishes with an increase of temperature from zero, to say, 400deg. Fahr., according to quality, though the difference in strength is but nominal throughout the whole range. When wrought iron is raised to a red heat in the daylight, or say, 1,100deg. Fahr., the tensile strength is reduced to about 42 per cent. of the original amount of strength. We refer our readers for full information on this interesting subject to the late Sir Wm. Fairbairn's valuable report thereon to the British Association in the year 1856.

For fear of being misunderstood, we will quote at length from p. 42 of "Shaw's Fire Surveys," before making any remarks on the subject of the effects of temperature on the strength of cast iron. Our author therein says:—"Cast-iron columns, in consequence of the small space they occupy, are now much used in supporting floors of warehouses and shops where light and room are of great consequence, and their strength is usually calculated according to the weight which they are designed to carry, the breaking weight being generally considerably over the load, thus allowing a sufficient margin for exceptional contingencies, such as vibration, or the falling of heavy

bales of goods; but in this calculation the question of any other temperature than that of the ordinary atmosphere appears to have been lost sight of altogether, and when it is remembered that at a temperature of 212deg. Fahr., or the boiling-point of water, cast iron loses about 15 per cent. of its strength; that at a temperature of molten lead, 612deg. Fahr., it has probably no strength at all, and that at a temperature of 2,787deg. Fahr., which is probably much below that of the centre of a large building on fire, it becomes liquid, it seems advisable to supplement this material with some other more trustworthy in case of heat."

The above paragraph is written in a most excellent style to impress the facts, or rather delusions, on the reader. Not only is the temperature given at which the writer of the little volume believes that cast iron loses 15 per cent. of its strength, but a reminder is given that that temperature coincides with that of boiling water. One is also correctly reminded of the fact that 612deg. Fahr. is the melting heat of lead, and also asked to remember that at that temperature cast iron has probably no strength at all. How can one remember that which one has never been taught? In what other works can be found like statements concerning the effects of temperature on the strength of cast iron? We have not heard of them, and hope never to do so.

Sir W. Fairbairn, in his report on the strength of cast iron, in Vol. VI. of the "Transactions of the British Association," gave the particulars and results of several experiments made by him to determine how far the strength of cast iron is influenced by such changes of temperature as it is liable to be occasionally subjected to. The experiments were made in winter, and the strains applied in the open air. Prior to the strains being applied, some of the bars were immersed either in frozen water or in molten lead, and in others were made red-hot. The remarks made by the late Mr. Eaton Hodgkinson, F.R.S., after considering the particulars and results of these experiments were: "It would appear, though the results were somewhat anomalous, that the strength of cast iron is not reduced when its temperature is raised to 600deg. Fahr., which is nearly that of melting lead; and it does not differ very widely, whatever the temperature may be, provided the bar be not heated so as to be red-hot."

As a matter of fact, the result of these experiments, as given in the tables, tends to prove that cold-blast iron is 12 per cent. stronger when heated to 600deg. Fahr. than it is at the temperature of boiling water (212 deg. Fahr.), and that in hot-blast iron the difference in strength in favour of the higher temperature is 7 $\frac{1}{2}$  per cent. By the same tables, it appears that when cast iron is heated to a red heat in the dark (750deg. Fahr.), the loss of strength is only 17 per cent. on the average with hot and cold-blast iron, and that cold-blast iron only loses a further 8 $\frac{1}{2}$  per cent. of strength, if the temperature be increased from that of a red heat in the dark to a perceptibly red heat in daylight, 1,100deg. Fahr.

We have now given our readers the facts to compare with the fictions promulgated in the hand-book referred to. We will not now discuss the collateral issues of expense, liability to fracture from sudden contraction where exposed, during a fire, to the application of water, &c. These are questions we prefer to consider hereafter; at present we will only ask our readers, Could any statements be more unwarrantable than these? Could any assertions be more mischievous to the iron trade, assuming their incorrectness to be veiled by the prominent and almost authoritative position held by the author?

(To be continued.)

#### FLOATING DOCKS.

AN improved construction of floating dock has been devised by Messrs. Latimer Clark and J. Standfield, which consists of a platform of horizontal circular iron tubes, which forms the bottom of the dock, the tubes having watertight compartments connected by pipes, and communicating with the apparatus for submerging. Series of upright cylinders form the sides of the dock. These are connected to the outer tube of the platform, and are placed at intervals of some feet, so that the air may freely circulate between them, and assist in the drying of newly-painted vessels. These vertical and horizontal tubes are securely braced together too, so as to afford the necessary lateral resistance. Along the sides or vertical cylinders, a platform or gangway is formed for



the use of the workmen, and these cylinders are also divided into airtight compartments. The means of sinking and flotation are simple. To submerge the dock, a series of valves on the underside of the platformtubes, are opened by the operator allowing water to enter, and at the same time another set of valves on the upper side of platform are opened, out of which the air is expelled by the water. The gear necessary for this operation is placed on each gangway, and the engines occupy two vertical cylinders, one on each side of the dock. After the above operation has been performed, the dock sinks to its assigned level, when the vessel is floated over it. Air is now pumped into the tubes under compression, and the water in them is driven out of the lower valves, till buoyancy is restored, and the dock rises slowly and uniformly under the vessel, both are raised, the latter resting upon the platform. The lower valves being now closed, the flotation of the dock with its vessel is secured without any further dependence upon the valves, which are firmly kept in place under air-pressure. This tubular form of dock can be utilised in many ways—for example, in raising pontoons under vessels, and floating them to any desired port for building purposes, and may, we think, be used for raising sunken vessels. It has several advantages over the ordinary dry-dock, as, in conjunction with pontoons, it can do the work of several docks. The form of the tubular dock is cylindrical, as most effective in resisting external pressure; and it has not the tendency to collapse as the square constructions. The cost appears to be in its favour, the prices being below those of other kinds. Various sizes are being made, and the largest ironclad vessel may be raised by its means. Compared with the ordinary floating dock, which consists of a watertight platform with side walls, into which the water is pumped and afterwards pumped out again, the advantages of the tubular construction are evident, while it also seems to possess merits over the hydraulic-lifting dock in which pontoons are used, and raised with the platform by hydraulic means. Simplicity of construction with great floating power seem to be combined, the tubular construction allows of repairs being made to the dock itself with greater facility, and, above all, offers to the pressure of water the most effective resistance, thereby ensuring durability—a most important desideratum.

#### CHIPS.

Mr. Jeremiah Griffiths Palmer, an architect at Roehampton, was charged on Tuesday at the Wandsworth Police Court with discharging firearms. The prisoner, who was remanded, declared he was garotted some years since on Clapham Common, and had since carried pistols for protection, and that on the present occasion he had been insulted by some persons and fired over their heads to frighten them.

New Board schools were opened at Swalwell, near Newcastle-on-Tyne, on Monday. The style is Gothic, and the cost £3,264. Mr. Alfred Swan, of Barrow-in-Furness, is the architect, and Mr. Spoor, of Whickham, the contractor.

The City Commission of Sewers have adopted by-laws providing for the management of slaughterhouses.

The foundation-stone of a new Episcopal church was laid at Ardrossan, N.B., on Monday. The style of architecture will be Early English, the details being simple and effective. The accommodation of the building will at first be for about 330 sitters, but provision has been made for extensions which will accommodate in all over 500. The designs have been prepared by Mr. D. Thomson, architect, Glasgow.

The parish-church of Midsomer-Norton is to be re-seated and otherwise altered, at an expense of about £1,000.

The Home Secretary has refused to sanction the plans submitted to him by the Corporation of Yarmouth for the enlargement of the Borough gaol, on the ground that the expenditure would not be justified in connection with such unsatisfactory buildings as those which exist.

New national schools were opened at Whitby on Monday. They are planned to seat 500 children—viz., 150 boys on the ground-floor, 150 girls on the upper floor, and 200 infants on the ground-floor. The architect is Mr. E. H. Smales, of Whitby, and the builder, Mr. H. Langdale, of the same place. The cost has amounted to about £1,800.

The new Protestant Church in the Avenue de la Grand Armée, which has been more than three years in course of construction, was opened on Sunday. The style of the building is simple. On the façade is cut in letters of gold the inscription, "Culte Evangélique de l'Etoile."

## Civil Engineering.

**NEW DOCKS, &c., AT HARWICH.**—The project for new docks, wharves, and warehouses at Harwich is again before capitalists. The proposal is to reclaim about 100 acres of foreshore immediately adjoining the town, in the estuary of the Stour, and for the construction of an inner harbour, docks, wharves, and sites for bonded and other warehouses and offices. The harbour is to be 20 acres in extent, giving a depth of 10ft. at low water, with a quay 1,000ft. long by 75ft. wide, and a new pier 545ft. long. There is also to be a graving dock, and space will be provided for a large floating-dock and wharfage space in connection therewith, 4,400ft. long by 70ft. wide. Owing to a great increase in the trade of Harwich, there is great need of enlarged dock and wharfage accommodation. There is an important traffic between the Continent and Harwich, which is the only harbour of refuge on the Eastern coast, and hundreds of vessels at a time put in during the gales, many requiring repair; but owing to the absence of graving docks, they are subsequently towed to London or the North.

**THE INSTITUTION OF CIVIL ENGINEERS.**—At the fourth ordinary meeting of the Session, 1874-5, held on Tuesday, the 1st of December, Mr. Thos. E. Harrison, President, in the chair, it was announced that the Council had recently transferred from the class of Associate to that of Member, the following, viz.:—Messrs. Thomas Edward Dunn, District Engineer, East Indian Railway; David Marr Henderson, Engineer-in-Chief to the Imperial Maritime Customs Service of China; Gabriel Jas. Morrison, Westminster; Middleton Rayne, Superintending Engineer, P.W.D., India; Henry Sadleir Riddings, B.A., Resident Engineer, Iquique Railway, Peru; and William Ridley, chief engineer of the Rio Tinto Railway in Spain. Also, that the following candidates had been admitted Students of the Institution, viz.:—Messrs. John Baker, Wm. Townshend Batten, Arthur Wilbraham Dillon Bell, Henry Taylor Bovey, Herbert Dornin, Charles Wm. Freke Farewell, Henry Edmunds Haddon, Henry Thomas Hall, Wm. Harker, Matthew Wilson Hervey, Henry Burdon Hutchings, Alfred John Ingram, George Arthur Jones, Robert Patrick Treddenick Logan, Walter Lucas Lynde, John Charles Mackay, Robert Valentine Milne, Carl Ernest Moline, Arthur Spence Moss, Alfred Thos. Mullaly, Henry Peacey, Alexander Davidson Stevenson, Harry Tee, Joseph John Tylor, Wm. Barton Worthington, B. Sc., and Julius Dent Young. The first ballot for the session resulted in the election of forty-nine candidates, of whom seven were Members, viz.:—Messrs. Robert Dundas, Engineer to the Glasgow and Paisley and the Glasgow and Kilmarnock Joint Railways; Robert Gordon, Ex. Engineer, P.W.D., India; Francis Baker Hanna, Resident Engineer, Madras Railway; Alfred Reid Clanny Harrison, Resident Engineer of the Northern Division of the North Eastern Railway; Peter Alexander Peterson, Chief Engineer of the Toronto Waterworks; William Henry Thomas, Westminster; and John Brown Young, Imperial Government Railways, Japan. Forty-two gentlemen were elected Associates, viz.:—Messrs. Henry Charles Baggallay, Student Institute of C.E., Assistant Engineer, Carnatic Railway, India; Donald Barlow Bain, Assistant Engineer, Oude and Rohilkund Railway; Charles Spruyt de Bay, Westminster; Donald Stuart Baynes, Engineering Staff of the East and West India Docks; Lieutenant James Brebner, late Indian Navy, Superintendent of the Hydraulic Lift Graving Dock at Hog Island, Bombay; Messrs. Francis Eustace Burke, Student Institute C.E., Temple; John Clark, Resident Engineer of the St. Pancras Station of the Imperial Gas Company; George Fitzroy Cole, late District Engineer on the Iquique and La Noria Railway; Alfred Davis, Westminster; Edward Baudouin Ellise-Clark, Engineer to the Ramsgate Local Board; George Estall, Engineering Staff of the Great Eastern Railway; George Lancelot Eyles, Westminster; Charles Richard Fenwick, Stud. Inst. C.E., Engineering Staff of the Midland Railway; George Findlay, Chief Traffic Manager of the London and North Western Railway; William Gilchrist Gilchrist, Stud. Inst. C.E., Asst. Engineer, Holkar State Railway; Harry Daniel Good, Engineer to the Level of Romney Marsh; John Duncan Grant, Assistant Engineer, P.W.D., India; William Ceall Gunn, Laurence Pountney Hill; Edmund Legh Harris, Odessa; Henry Beecroft Harvey, P.W.D., Ceylon; William Harvey, Assistant Engineer, P.W.D., India; Lieut. Henry Sidney Freeman Hayes, R.E., Assistant Engineer, P.W.D., India; Messrs. William Marshall Hewatt, Assistant Engineer, Leth Docks; John Hewson, Assistant Engineer to the Municipality of Bombay; William Edward Horn, Stud. Inst. C.E., Westminster; Fletcher James Ivens, Stud. Inst., C.E., Assistant Engineer in H.H. the Nawab of Bhawalpore's State; George John Manders, Manager of the Dom Pedro Norte del Rey Gold Mining Company, Brazil; David Edward McDonald, Harbour Engineer of Auckland, N.Z.; Kenneth William Allister Grant M'Alpin, Pembroke Dock; William Holt Martin, Nottingham; Vitale Domenico de Michele,

Rochester; Lieut. John Francis James Miller, B.Sc., Ex. Engr., P.W.D., India; Messrs. Munchejee Cawasjee Murzban, Asst. Engr., P.W.D., Bombay; William Ensor Parry, Ex. Engr., P.W.D., India; Thomas Peacock, Stamping Department, Somerset House; Alfred Phillips, Borough Surveyor of Dorchester; Alfred Coveney Priestley, West Brompton; John Rawlins, Manager of the Metropolitan Railway and Carriage Works, Saltley, Birmingham; Frederick Ewart Robertson, Ex. Engr. P.W.D., India; Frederick Smith, Borough Engineer of Blackburn; Harrison Vevers, Engineer and Manager of the Bolton Corporation Gas Works; and Samuel John Wilde, Serjeants' Inn.

## ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETIES.

**ARCHITECTURAL ASSOCIATION OF IRELAND.**—The opening meeting of the Session for 1874-5 of the above Society was held on the 26th ult., Mr. Wm. Mitchell, F.R.I.A., in the chair. The president, in his inaugural address, reviewed the progress of architecture of late years in the erection of dwellings, and pointed out the necessity of strict observance of proper sanitary arrangements in the construction of buildings. He referred hopefully to the prospects of the Association, and said there could be no doubt that the time was near when the profession would receive a charter from the Government, and when they would have a representative head, such as the professions of law and medicine had. They would then have architects worthy of the age and country. He regretted that Dublin was exceedingly backward in architectural improvement and design, while other cities were keeping pace with the progress of the age.

**BIBLICAL ARCHÆOLOGICAL SOCIETY.**—At the usual monthly meeting of this Society, held on Tuesday evening, the president, Dr. Birch, in the chair, 23 new members were admitted and 18 others proposed. Two papers were read:—1. "On a Mythological Inscription in the Tomb of the Pharaoh Seti I. (the so-called Belzoni's Tomb) at Thebes, by M. Edouard Naville, of Geneva. The inscription represents Ra, the Sun-god, the creator of mankind, as so disgusted with their impiety and insolence, that in a council of the gods he decrees their extermination, and a deluge of blood reaches to Heliopolis. Ra afterwards repents, and orders certain deities to swallow up the sanguinary flood. M. Naville cites Plutarch, Porphyry, and Seleucus, who relate that human sacrifices of red-haired men, Libyans, and Arabians, were anciently offered at Heliopolis, and were abolished by Amasis, the first Pharaoh of the great Eighteenth Dynasty. To this abolition of the bloody rite he thinks the inscription alludes.—A paper "On a Monument of Haremhebi," by Dr. Birch, contained an account of an inscription relating to the coronation of the monarch Haremhebi or Horus. The endowments of the temple of Ammon at Thebes, Heliopolis, and Memphis were also alluded to in the inscription.

**BRITISH ARCHÆOLOGICAL ASSOCIATION.**—At the meeting on the 25th ult., Mr. W. de Gray Birch, Hon. Sec., announced the completion of the general index to the *Journal* of the Association, Vols. I. to XXX., and invited the Associates to subscribe for copies. Mr. Cuming exhibited and made remarks on two Mediæval Costrels, or Pilgrims' Bottles, forwarded from the Bailly Collection. Mr. T. Blashill exhibited two French Jettons, of latten, of the fourteenth century; and two London Tokens, one of Margaret Lucas, of Limehouse, 1663, the other of Stephen Porter, at the Nag Tavern, Bell-yard, 1667. Mr. H. Davis exhibited two Mediæval Spoons and a Tobacco-box of Dutch work, with Scriptural subject graven on the lid and base, inside of which was the inscription, "William Hammond, Glover, in Lynn, 1728." Part of a letter was read from Mr. Watling respecting operations upon some mural paintings now under course of restoration at Stonham Church, Suffolk. Mr. Cuming read a paper on "St. Gertrude of Nvelles," and another paper on "Mum and Mum-Glasses." An extensive collection of iron antiquities, lately discovered in London excavations, had been forwarded by Mr. E. Roberts, Hon. Secretary, but owing to the unavoidable absence of that gentleman, the examination of the relics was postponed to the ensuing meeting.

**EDINBURGH ARCHITECTURAL ASSOCIATION.**—The fortnightly meeting of this Association took place on Wednesday week, in the rooms, Mr. Robt. Anderson, president, in the chair. A paper was read by Alex. Hunter, M.D., F.R.C.S.E., on



"The Principles of Drawing, Geometry, and Colour, as taught amongst the Hindoos." The paper was illustrated by a large number of photographs and drawings.

**EXETER ARCHEOLOGICAL SOCIETY.**—The first winter meeting of this Society was held on Wednesday week, when the inaugural address was delivered by Mr. R. A. Hamilton. Papers were read by Mr. W. Cotton, F.S.A., on "Exeter, and the Wars of the Roses"; by Mr. W. S. M.D. Urban, on "Ancient Saxon Documents in the Albert Memorial Museum," and another by the same gentleman on "Antiquities Discovered at Broadgate."

**LIVERPOOL ARCHITECTURAL AND ARCHEOLOGICAL SOCIETY.**—The third meeting of this session was held on Wednesday last, when a paper was read by W. P. Griffith, Esq., on "The Study of Ancient Architecture and its Application to Modern Use." Mr. Mercer then gave some explanations as to the use of the instrument he has invented for measuring distances and taking levels.

## Building Intelligence.

### CHURCHES AND CHAPELS.

**BELFAST.**—There is now being erected at Carlisle-circus, Belfast, a new church, the gift of Alderman James Carlisle, J.P. The stone employed in its construction is Armagh limestone, with dressings of red Dumfries stone. The style is Gothic. A spire and tower will rise over the principal entrance, in height from ground to top about 170ft. The church is arranged to seat about 1,000 persons. The entire cost will be between £15,000 and £20,000. It is expected that the building will be completed in eight or ten months. Mr. Henry is the contractor, from designs by Mr. W. H. Lynn, of Belfast.

**HASTINGS.**—A new church is about to be erected at Hastings on the Blacklands Estate, in memory of the late Mrs. C. H. Frewen. The plans have been prepared by Mr. Henry Carpenter, of Moorgate-street, London. The design is Gothic, and comprises nave and aisle 74ft. 6in. long, and 66ft. 9in. wide; chancel, 28ft. 9in. long, and vestry. Sittings will be provided for 750 persons. The exterior walls will be of local blue stone. Mr. H. King will be the builder.

**HEALING.**—Healing Parish-church, near Stallingborough, has just been reopened, after restoration. The church comprises nave, chancel, and tower, and was originally erected in the early part of the thirteenth century, since which time it has been all but entirely rebuilt, the only remains of the original structure being the tower pillars. There is reason to believe that the church was originally much larger than at present. Before the recent restoration, the roof, covered with brick tiles, and the north wall of the nave, were in a ruinous condition—so much so, indeed, that they were constantly expected to collapse. In March last the work of restoration was commenced, from plans prepared by Mr. James Fowler, architect (and Mayor of Louth). The north wall has been entirely rebuilt, and the south wall repaired; a slated roof, supported by interlaced stained rafters, has been erected; open seats of stained deal have been substituted for the old-fashioned pews; and in place of the east gable a new chancel arch has been built. Mr. J. Thompson, of Louth, was the builder, and the cost was £565.

**NEWCASTLE-ON-TYNE.**—The church of St. Nicholas, Newcastle-on-Tyne, which we illustrated in the BUILDING NEWS of March 4, 1870, has now been under restoration eighteen months, and the Executive Committee have just issued a report of the progress made under the direction of Sir Gilbert Scott. Contracts have been entered into for the complete structural repair of the whole building, and for the interior fittings of the nave, at the prospective cost of £13,000. The whole clerestory has been repaired or rebuilt from east to west. New windows have replaced the old ones. New windows have been placed in the north transept and the porch adjoining. The whole of this portion has been substantially restored, and the roof is now being put in sound repair at a small extra cost. The nave-roof and those of the aisles have been completely restored; the whole interior has been denuded of plaster, cleaned, and pointed. The monumental stones are being relaid, in contemplation of the speedy

adjustment of the area for the purposes of worship, for which end the seats are already being prepared. The south transept is now being most carefully rebuilt.

### BUILDINGS.

**LEEDS.**—The new hospital, which has been built adjacent to the Leeds Union Workhouse, in Burmantofts, was opened on Thursday week. The foundation-stone of the workhouse itself was laid on the 5th April, 1858, and along with it there was erected an infirmary for 150 patients, that being then amply sufficient for the accommodation of the sick inmates. A few years ago this became insufficient. Accordingly, in 1870, a general invitation was advertised to architects by the Board of Guardians to compete for the erection of a new union hospital, the original conditions being that the structure should be designed upon the Pavilion principle, with not less than 1,200ft. of space per bed. Twenty-seven sets of designs were sent in, and that of Mr. Henry Walker, Leeds, was chosen from amongst them to be carried out. The selected design, however, was disapproved on being submitted to Dr. Smith, the medical officer of the then Poor Law Board, who saw no necessity for isolation in a workhouse hospital, or for an allowance of more than 800 cubic feet of space per bed. After several interviews, and much correspondence and delay, the guardians were obliged, although reluctantly, to abandon the Pavilion principle, and to submit to a modification of the design in other respects, in order to obtain the sanction of the Poor Law Board. The design now carried out, as prepared by Mr. Walker, is based on the block system. The design is of a Gothic character, in agreement with the architecture of the surrounding buildings, and is executed in brick, with stone dressings, at a cost of about £18,000.

**ENFIELD.**—The foundation-stone of the new cottage hospital was laid on Saturday last, by Mrs. James Whatman Bosanquet, of Claysmore, Enfield. The building is of one story, and provides for men and women's wards (four beds in each), one extra small ward, one bed operating room, nurses' room, kitchen, scullery, bath and storerooms, and w.c.'s. The architect is Mr. T. J. Hill, of 32, City-road, and Enfield, and the builder Mr. A. Fairhead, of Enfield. Total cost, £1,080.

**PICCADILLY.**—The St. James's Hall Company have purchased further properties in Piccadilly, and intend erecting more extended buffets, grill-rooms, and other conveniences in connection with the hall and restaurant. The frontage in Piccadilly will be about 46ft. The altered plans are now nearly completed. The elevation in Piccadilly will be Italian Gothic, mostly in red terra-cotta and red Mansfield stone inlaid with mosaics. Contracts have been entered into with Messrs. Dawney for the ironwork; Messrs. Gibbs, for the mosaics; and Messrs. Johnson, of the Ditchling Potteries, for the terra-cotta. The works are under the superintendence of Mr. Walter Emden, architect.

**WEMYSS CASTLE.**—Wemyss Castle, the residence of Mrs. Erskine Wemyss, one of the finest places in Fifeshire, and historically interesting as having been the scene of the first meeting of Queen Mary and Darnley, is being greatly added to and improved. A new entrance hall and saloon are being built on the north front, and on the south side, facing the sea, a massive arcade of six arches, springing from circular pillars 3½ft. in diameter, carries a fine terrace or balcony, 90ft. long and 8ft. broad, in front of the drawing-room and library windows. The new saloon will be 75ft. long, 22ft. broad, and 26ft. high, with a music gallery at the east end. A new approach to the castle, upwards of a mile in length, is also being made, and an entrance gateway and lodge are to be built in connection with this. The works are being carried out from the designs of Messrs. Peddie and Kinnear.

### SCHOOLS.

**WEGGENHALL ST. MARY, NORFOLK.**—The School Board for this parish have decided upon erecting new schools to accommodate 160 children, from plans supplied by their architects, Messrs. Adams and Son, of King's Lynn. The site chosen is on a meadow facing the lodge at the junction of the Marshland and Stow roads.

A new font, executed by Mr. Boulton, of Chester, in Caen stone, from a design by Mr. Haycock, architect, was recently erected in St. Michael's Church, Shrewsbury.

### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 21, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

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Subscribers receiving their copies direct from the office are requested to observe that the last number of the term for which their Subscription is paid, will be forwarded to them in a *coloured wrapper*, as an intimation that a fresh remittance is necessary, if it be desired to continue the subscription.

RECEIVED.—J. B.—J. W.—J. P. K.—J. F. and Sons,—H. W. and Son.—W. H. and K.

**JOHN T. RAWLE** (The drawings to hand).—W. E. MILLS (Please send description referred to in your letter).—**AN OLD SUBSCRIBER** (We have the cases for binding the BUILDING NEWS in stock).—**RED ROOFING TILE** (We do not insert queries asking for the addresses of tradesmen and manufacturers).—J. D. (The previous articles on "Firebricks" referred to in the recent series on White Bricks appeared on pp. 172 and 195, Vol. XXI. We do not know who is the maker of Walker's Patent Press. You might advertise through our columns for his address).—**ENTRE NOUS** (Ferguson's "Handbook of Architecture" is the most complete our correspondent could get on the subject; the price is about 45s., Murray and Co. A very good little manual on the subject, entitled "Style of Architecture," is published in Lockwood's series, price about 2s. We may mention also a recent book by Mr. Mitchell).—**TENORS** (There is nothing new in the staircase you speak of. We gave an illustration of it on the 24th of July last).

## Correspondence.

### THE CONSTRUCTION OF WAREHOUSES AND WORKSHOPS.

(To the Editor of the BUILDING NEWS.)

SIR,—I also compared the figures given by Mr. Homersham for cast-iron columns with those given in "Hurst's Handbook," as referred to by your correspondent "G. K.," and it appears to me that both Mr. Homersham and Mr. Hurst have adopted Hodgkinson's formula; but the former gentleman has taken something like one-fifth of the breaking weight, whereas the latter takes one-tenth, or if the decimal point be omitted in Hurst's tables, they give the calculated breaking-weight according to Hodgkinson's formula very nearly.

For my own part, I prefer taking the safe load at one-tenth instead of a fifth, owing to the risk of flaws in cast iron, and also the danger of a heavily-laden column snapping by a comparatively small force applied transversely. There is also another reason which to my mind settles the point. If your correspondent "G. K." would refer to p. 41 of Mr. Anderson's book "On the Strength of Materials" (Longmans' Textbooks of Science), he will there find that a long bar of cast iron was permanently injured by one-



seventeenth of the crushing weight, and, on p. 43 of the same work, a specimen lin. long and over  $\frac{1}{2}$  in. diameter, took a permanent set of 1-2,000th part of the length on the application of less than one-thirtieth of the crushing load.

I should also observe that Hurst's formula, as given on p. 17 of his Handbook, differs slightly from that of Hodgkinson's, as given in the Philosophical Transactions of 1840, owing to the former omitting the decimal part of the constant and taking 3.6 instead of 3.55 for the power of the diameter, which may account for the discrepancy between Mr. Homersham's figures and those of Hurst not running quite parallel.—I am, Sir, &c.

Nov. 28th.

JAALAM SMITH.

## PULPITS.

SIR,—Wall-lecterns in Refectories remain at Beaulieu, Chester, Chichester, Shrewsbury, &c. For pulpits for preachers in and out of doors, see the word in "Sacred Archaeology." The late Bishop of Winchester once preached from the rood-loft of Christchurch, Hants. The former were used according to the verse, Sit timor in dapibus, benedictio, lectio. . . . The dinner being eaten "audita sacræ Lectiois" (Jo. de Athon. in Const. Othob. tit. xlviii. p. 150).—I am, Sir, &c.,

MACKENZIE E. C. WALCOTT.

## SEWER GASES.

SIR,—The efficient ventilation of drain and soil-pipes has now become such a fully-recognised necessity, and the details of arrangements for that purpose have been so fully worked out, that we may confidently anticipate the adoption of means to that end in most (if not in all) buildings containing, or to contain, w.c.'s. Under these circumstances, it appears to me, professional men should endeavour, as far as possible, to foresee the probable results of a wholesale application of the system advocated, in order to guard against any evils likely to arise therefrom.

The gases emanating from sewage and discharged from soil-pipes are well known to be of the most noisome and pestilential character, and probably promote the spread of zymotic diseases more than any other causes, chiefly, no doubt, by the dissemination of germ particles. The energy of their destructive action is well exemplified by the decay of the upper portion of horizontal soil-pipes and other places exposed to their action, the lower sides being protected by liquid and soil. Dr. Andrew Fergus estimates that unventilated lead soil-pipes decay in 12 years in this manner, and when ventilated in 21 years. Sulphuretted hydrogen arising (amongst other gases) from soil is undoubtedly one of the most deleterious of aerial poisons, and its deadly influence is shown by the fact that air impregnated with only a 1,500th part of this gas kills a bird in a very short space of time. It is, however, unnecessary to give further illustrations of the poisonous nature of sewage gases, newspaper readers being only too familiar with examples of the general action, though the extreme malignancy of the exhalations are mostly unthought of. Dr. Angus Smith has approximately determined the distances to which acids from alkali works are distinguishable, but no one, I believe, has given us any data of this kind with respect to the emanations from sewers and soil-pipes, although it is a well-known fact that in the summer, when the air is more rarefied than in the winter, the abominable stench is perceptible at great distances.

The object aimed at in all discussions on the ventilation of soil-pipes, &c., has been to keep the noxious gases from reaching the population. Now, does it necessarily follow that by polluting the air with them this goal is best attained? I think not. In alkali works the manufacturers are compelled by Act of Parliament to consume at least 95 per cent. of the gases which they used to discharge into the air; now, as the number of houses with ventilated soil-pipes will soon, probably, many hundred times exceed the number of chemical works, and as each w.c. is a manufactory of sewage gas, it follows that the air will be polluted by them to a very large extent, and by a gas far more pestilential in its effects than any evolved from manufactories. The question then arises, Granted that ventilation of soil-pipes is a considerable advance in the right direction, ought not occupiers of houses containing w.c.'s to be compelled in like manner to consume the greater

part of the sewer gases evolved in them, by charcoal, chloralum, or other suitable means?

In this question I have intentionally omitted all reference to the utilisation of sewage, drainage, and the evil of cesspools, and other methods of polluting water-bearing strata, as, putting those questions entirely on one side, the best method of dealing with sewage gas in soil-pipes appears to me a veritable "rock ahead."

Plymouth, December 1st, 1874.

E. O.

## A SCIENTIFIC AND SAFE WATER-CLOSET.

SIR,—At the first glance at the above letter in your last week's impression, I was in hopes the long-wished-for perfect water-closet would be the outcome of it; but after reading same, I regret the contrary appears to be the case.

1st, take the ventilating-pipe L in roof: why should this be required, when there is a window in outer wall which should give light and ventilation? Consequently the pipe would be a source of annoyance, as it would occasionally admit cold draughts and blacks from roof on to heads of users, also entail needless expense for gas from bracket M. The ventilating pipes H and F are not new ideas, they having been in use for many years in all good and proper work (should your engraving be a correct copy of the sketch). The soil-pipe D is a most objectionable arrangement, for the reason that the foot enters the top of drain-trap B, over which is placed an open grating C, which consequently allows the stench from soil passing through soil-pipe into drain to escape through the open grating C into yard or area every time the apparatus is used; further, the soil-pipes, after a few years' use, become coated and corroded by soil, urine, &c., which will stink as bad as sewer gas. Consequently the stench from open grating C would be continuous, and in the case of a large house where there are, say, three closets placed over the other, all communicating with one soil-pipe, which would be, say, 60ft. long, you may be sure the stench would be unbearable. Also, should the drains be choked at any time, the sewerage and soil would be forced up the grating into yard.—I am, Sir, &c.,

J. W. DUFFIELD.

Park-lane, Kensington Gore, S.W., Nov. 28, 1874.

## Intercommunication.

## QUESTIONS.

[3575.]—Free Trade Hall, Manchester.—Will any fellow-reader kindly inform me if any illustrations of the construction (especially of the roof and orchestra) of the Free Trade Hall, Manchester, were ever published, and if so, where.—J. G. P.

[3576.]—Public Halls.—Will some of your readers kindly reply as to what are the best proportions in length, width, and height for a public hall to be so constructed that all may see and hear? For example, would 100ft. long by 60ft. wide—i.e., any multiple of 5 by 3—be a good and proper proportion, and what should be the height of such proportion; also what means should be taken to prevent echo in the building?—W. GURLEY SMITH.

[3577.]—Getting Tin off Iron.—Which is the best plan to adopt to get the tin off iron that has been tinned? Where said iron has been heated red-hot and the tin sort of run into the iron, can the tin be got out? What chemicals, if any, could be used to get rid of the tin? It is desired to weld the aforesaid iron, but the presence of the tin prevents that.—TUBAL CAIN.

[3578.]—Technological Dictionary.—Can any of your readers inform me of a small French-English technical dictionary?—C. H. M. [We can recommend "Dictionnaire de Poche Technologique" (Trübner and Co.) as a good one.]

[3579.]—Deductions.—In a set of quantities for an alteration the following items were given approximately to cover an unknown quantity of piping:—Allow for the following if required:—100ft. lineal  $\frac{1}{2}$  in. lead pipe, 50ft. lineal  $\frac{1}{2}$  in. lead pipe, 75ft. lineal  $\frac{1}{2}$  in. lead pipe. In pricing the foregoing, the contractor who carried out the job inadvertently priced out the leading at £5. In adjusting the accounts at completion all piping used was measured and allowed to the contractor, credit being then taken for the piping set forth as above, and the £5 previously alluded to. Was this justifiable or otherwise?—F.

[3580.]—Contingencies.—In a contract executed in accordance with drawings and specification, only a given sum was set apart for contingencies. The contractor contends that he is entitled to this amount, inasmuch as work of superior quality has been executed in some instances, and that he has taken all risks throughout the job, including that of quantities, &c. The employer, who is willing to pay for all extra works ordered by himself in writing, as stipulated in the contract, claims credit for the sum in question, contending that it was specially introduced to cover and pay for such extra works. Which is the correct view of the question?—F.

[3581.]—Speaking-Tubes.—Could any reader inform me if speaking-tubes have ever been used

throughout a dwelling in lieu of bells, and if with satisfaction? What produces the effect in the Whispering Gallery of St. Paul's? Is there anything peculiar in the construction besides its being circular?—STUDENT.

[There can be no objection to speaking-tubes being introduced in a house, though we cannot recall an instance where they have been used exclusively. The effect of the echo in the Whispering Gallery of St. Paul's is entirely due to the reflection of the sound-waves from one focus to another. If two conjugate reflectors are placed some distance apart, and a sounding body be placed in the focus of one, the sound diverging from it will be reflected to the other point or focus of the second mirror or reflector, and may be distinctly heard there. Smooth surfaces are necessary.—ED.]

[3582.]—Hydraulics.—Will W. P. Buchan give a scientific explanation of the increased flow through a contracted aperture he mentions in his reply (3530), as I cannot understand the rationale?—LIVE AND LEARN.

[3583.]—Roof.—What is the best framing for a church roof of 20ft. span, high pitched? Is a collar roof sufficient, and how should it be constructed?—QUERIST.

[3584.]—Force-pumps.—Will some reader kindly give me any information as to the lifting-power of an ordinary pump?—ARCHIMEDES.

[3585.]—Ventilation.—How much air is vitiated in an hour by an adult, and how much air-space is considered sufficient for an ordinary dwelling-room?—STUDENT.

[3586.]—Chimney Shafts.—How is the draught calculated in a shaft?—ECONOMIC.

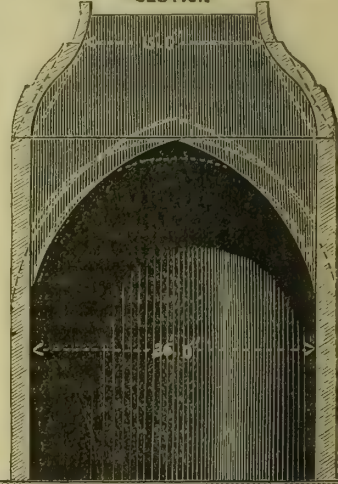
[3587.]—Estate Agent's Charges.—Will some one say what is the proper charge or percentage to be made by an architect for the sale or letting for building of land, and whether such charges or percentage should cover any expense incurred, such as advertising, travelling expenses in visiting the property with applicants, &c.?—ARCHITECT.

[3588.]—Ventilation for Weaving-Shed.—As a reader of your valuable paper for many years, I should take it as a great favour if you, or some well-wishing correspondent, would tell me of a good ventilator, or a good system of ventilation, for a large weaving-shed, to be constructed either in the ceiling or lights in roof, or both. The shed is to hold about 400 looms for cotton weaving. The shed is open to rafters; the ceiling is merely underside the rafters, and is lathed and plastered. An answer to this will greatly oblige me. The roof is constructed on the louvre principle, the rafters being unequal, the flat long slope being slated and the short rafters ends being lights. There are seven 16ft. bays in width and fourteen long.—PURE AIR.

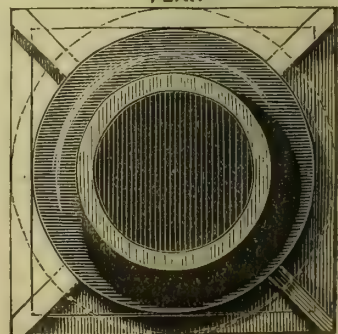
## REPLIES.

[3549.]—Circular Shaft upon Cylindrical

## SECTION



## PLAN



Vault.—Your suggestion of a cast-iron frame fitted to the inner curvature of the arch, on which the



courses of brickwork could abut, would no doubt answer the purpose required; but would it not be expensive in a locality where iron is dear, and in all cases difficult to fix? I beg to suggest an alternative plan in brickwork only, which I have several times made use of for doming over square kilns, so as to bring them to a cylindrical section tapering upwards to a much smaller diameter than 15ft., sometimes even to 2ft. 6in. I inclose a tracing showing a rough sketch of a section through the shaft. The gathering in at the angles commences at about 6ft. below the crown of the arch. The brickwork in the gathering-in or waist of the shaft is laid in heading courses, and it is preferable that the whole of this portion of the work should be built in cement. The radiating courses of the arch should be continued through the buttresses at the angles, so that they may be firmly bonded together. If the projections of the over-arching courses are objected to, moulded bricks may be used, so as to present a perfectly smooth surface on the inside of the gathering. By this arrangement the weight of the shaft will be sustained by the completed arch and the side walls.—CHARLES TURNER, 3, Bugle-street, Southampton.

[3530].—Hydraulics.—At page 653, 34th line down from the beginning of Replies, for, that the 1½ in. pipe be "contracted to ¾ in. internal diameter," read that it be "contracted to ¾ in. internal diameter."—W. P. BUCHAN.

[3530].—Hydraulics.—W. P. Buchan's experiments certainly appear rather conflicting with the experience of others. He says that if a 1½ in. pipe, such as that mentioned by "E. W. T.," 6ft., and, with 6ft. pressure, were to have a contracted outlet of ¾ in., the water would come out with such a force as to rise up into the air about 4ft. above the orifice. W. P. B., while supporting his own views, has not in the slightest degree shown how it is the cistern of "N. A. H." should have remained empty, unless, indeed, we admit the air hypothesis in the horizontal pipe, which appears hardly tenable in the case referred to. If W. P. B. had explained the anomaly by friction, he would at least have more rationally treated the subject.—G. H. G.

[3549].—Circular Arch upon a Cylindrical Vault.—I quite agree with the Editor that the curb or frame referred to would be a good mode of construction; but I think in this instance the frame or curb should be wrought, and not cast, iron. In mining districts one frequently sees large purpose-made bricks corbelling one over the other to carry the courses referred to as resting upon the broken courses; but that is undoubtedly an unsatisfactory way of getting over the difficulty, and it is with great interest that I look forward to an answer from some of your practical readers, who will, I have no doubt, be able to get over this difficulty.—MINING ENGINEER.

[3549].—Circular Shaft upon Cylindrical Vault or Tunnel.—I should make the base of the shaft conical, and to form a groin with the tunnel arch, and which I think would have the merit of being very strong and well suited for light and ventilation. The excess of materials would be very slight.—BUCKLE.

[3551].—Measuring Plaster Work.—Another question mainly governed by the locality, as evidenced in "L.'s" reply. Why will querists not append this information to their question when it is evidently necessary, and its neglect produces such "confusion worse confounded"? In the North of England plastering is measured from floor to ceiling (if skirtings are plastered behind), and from wall to wall for ceilings. Cornices consequently become a sort of *extra* only item. All openings are deducted, and those under 100ft. superficial are collected and given at per yard for labour only.—F.

[3556].—Day Wages.—In some large towns builders' associations issue price lists regulating the charges to be made by their members both for time and material—charges that are in many instances far in excess of the ordinary acceptance of the term "proper profit." Builders outside the pale of these associations make their own charges, according to rule of conscience, some being satisfied with fair profits; hence the charming variety quoted by "L." and previously noted by myself. 20 per cent. was at one time considered a proper profit by leading builders; at present the list-price for one hour's services of a workman receiving 7d. or 8d. per hour is 10d. under the rules of a certain builders' association. If "L." would name his location, further information might be supplied.—F.

[3558].—Strength of Iron Columns.—In reply to "L." of course the height of each separate column, and not the whole height of the floors of the warehouse, must be taken, as it is the *unsupported length* of a column or strut that is taken into the calculation. The floors, in fact, act as so many lateral ties supporting the columns at their caps and bases; and therefore it would not be necessary to take the total collective heights in calculating the strength. Of course the lower columns would require the greatest diameter—in fact, the diameters should diminish in the same ratio as the heights.—G. H. G.

[3559].—Tracing-cloth.—1. Some powdered French chalk rubbed in with a little pellet of blotting paper will make the tracing-cloth take the ink, care being taken to dust off all the loose particles of chalk before inking. 2. Breathe gently on the cloth imme-

diately before inking. 3. Slightly acidulate the water to be used for rubbing the ink with oxalic acid.—L.

[3559].—Tracing-cloth.—"H. J. H." will find that by mixing a very small portion of ox-gall with his ink it will flow with ease over the cloth.—T.

[3559].—Tracing-cloth.—Mix ox-gall with the ink.—F.

[3561].—Cement for Slating.—Half Portland cement and half clean sand, gauged with a little old mortar (not old set mortar, but mortar which has been made for some time and heaped) in which every particle of lime is thoroughly slaked. The cement is more reliable if quite "cold"; to insure this, turn it out for a month on some quite dry warm floor. Well wet the brickwork, and so set on the fillet that it has more contact with the bricks than the slates, say let it run 2in. up the bricks and 1in. over the slates. If possible do not run the fillet on a hot sunny day. Never cover over decayed fillets with new cement, or they will burst with the first frost; cut them completely away and run them anew. There is some system of cutting the slating battens an inch short and laying a small zinc gutter on the back of the rafter in the space thus obtained under the slates, delivering at the eaves, and so dispensing with either fillets or flashings, there being apparently neither. Can any of your Intercommunication readers favour with a sketch?—L.

[3562].—Wire Gauze over Ventilators.—I have had the following communicated to me by a builder, and it may be of use to "X." and others:—Take a sheet of metal, and with a "centre-punch" make it full of holes, with as much "burr" as possible on one side (similar to the rose of a common watering-pot). If an experiment be made by means of a common bellows and a candle, it is surprising the different effects of a current of air against the respective sides of the sheet of metal so perforated.—T. S.

[3562].—Wire Gauze over Ventilators.—The wire gauze discs would only be efficient so far as they partially checked the cold air, and the warmth to be obtained by their means would be so very trifling. A respirator contains a number of discs, and is, I believe, sometimes used to temper the dryness, at others to reduce the humidity, of the air inhaled, according to the particular kind which is used. Why not supply the room with proper inlets at other appropriate points; if cold air, at about 6ft. high, through channels delivering vertically; if warmed air, through channels delivering horizontally? If this be done, the orifice in the ceiling will act as an outlet. This may be easily tested with a lighted taper held to the ceiling orifice when the air is descending through it. Set open a window or a door in communication with the outer air, and it will be observed that the effect at the ceiling opening will be reversed, and a strong up-current will ensue.—L.

[3563].—Ancient Lights.—"S. L." will not lose his right to receive light by his ancient windows if pulling down the wall in which they are placed if he does nothing to imply that he has abandoned them, and if he proceeds within reasonable time to reinstate them. He may even enlarge them and place new windows, under some circumstances; as, for instance, if the adjoining proprietors over whose property the light comes to the old windows cannot obstruct the light to the new windows or to the new portions of the old windows without at the same time obstructing the old windows or the old portion of the new windows, "S. L." would have his remedy against them.

[3563].—Ancient Lights.—I think the rebuilding of the wall in question would annul your claim to the lights in the wall.—G. H.

[3564].—Chimney Shafts.—Armstrong on Furnace Chimneys—publisher, Spon; Spon's Dictionary of Engineering—article "Chimney;" Edwards on Smoky Chimneys—Edwards, Great Marlborough-street; and a cleverly-written little work, "Smoking Fires—their Cause and Cure," by the Rev. Alex. Colvin Ansle, M.A., vicar of Corfe, Somerset. Longmans and Co., publishers.—L.

[3566].—Stable Ventilation.—I should recommend a shaft carried up from the ceiling of stable through loft and roof, formed of matched boarding, with a louvre ventilator at top. I have inserted one 2ft. square in a stable for six horses, which works well. In this case I have also provided inlets at the back of each stall, formed with iron grating in external wall, connected internally with a 4in. earthenware pipe laid under paving, with 1½ in. iron branch pipes carried to a height of 6ft., and fixed against the wall.—T.

[3566].—Stable Ventilation.—Watson's siphon ventilator, which consists of a trunk divided by a diaphragm into two parts—one an upcast, and the other as a fresh air inlet—is a plan I have adopted; the trunks are carried through the loft to the stable ceiling.—G. H. G.

[3566].—Stable Ventilation.—An illustrated catalogue, either from Musgrave and Co., of Belfast, Cottam, or the St. Pancras Co. would be of service to "Country." An airtight trunk is usually introduced when a loft intervenes.—F.

[3567].—Quantities of a King-post Truss.—Cube the timber and give it in one item as "framed timber in truss complete," numbering and accurately describing bolts, straps, and other matters separately; or, measure each portion linearly, keeping the various sizes separate, and afterwards give an item with accu-

rate detailed description for framing, hoisting, and fixing truss, numbering bolts, &c., as before. As the method of taking quantities varies in almost every county, to obtain accurate information regarding the manners and customs of his precise locality, "Learner" should impart some slight intimation of his whereabouts. Builders, as a rule, will not understand any method of quantities other than what they have been accustomed to; and with the majority the reason is obvious. Consequently, it is simply the application of the trite aphorism *anent Rome and her denizens*.—F.

[3567].—Quantities of a King-Post Truss.—Take king-posts, principal rafters, and tie-beams at per foot cube framed. It is customary to deduct one shoulder from the king-post as equivalent to the reduced size of the post in the middle. For queen-posts one half a shoulder is deducted. The labour of cutting the shoulders is supposed to compensate for the reduction of scantling.—G. W.

[3568].—Measuring Mason's Work.—"Student's" request is somewhat comprehensive; it would be prudent to particularise somewhat. The art of measuring mason's work can barely be mastered complete in one lesson.—F.

[3569].—Slate Tanks.—1½ in. sawn slate bottom and 1½ in. sides; the whole grooved, put together with red lead, and secured with four ¾ in. diameter wrought-iron screw bolts or rods put through the back and front outside the ends. A class of artisans yeelpit plumbers are generally intrusted with the execution of works of this description.—F.

[3570].—Filters in Cisterns.—Atkins's charcoal filter affords a good method of insuring pure water; they are of cylindrical shape, and of various sizes. Ransome and Co. have also a silicious composition filter which may be applied in the same way.—G. H.

[3571].—Firebrick Backs to Stoves.—The back should be sloped so as to obtain the greatest thickness at the bottom, where the fire is hottest. A hollow airspace left between the fireback and the back of the grate is a good feature, as it promotes combustion and the consumption of smoke. Boyd, of London, and Messrs. Shillito and Shorland, of Manchester, are makers whose stoves have been largely used by the London School Board. If "Fuel Economist" will communicate with me at 49, Hamilton-square, Birkenhead, I can give him further information.—W. E. MILLS.

#### STAINED GLASS.

THE GUILDHALL.—A further adornment has recently been added to this celebrated City structure, by the erection of a new stained-glass window, which has been presented to the corporation by Mr. Deputy Harris. The subject illustrated is the Restoration of the Charter of the City, and is referred to by Macaulay, Vol. II. p. 462-3, thus: "It was determined that the Charter of the City of London, which had been forfeited six years before, should be restored, and the Chancellor was sent in state to carry back the venerable parchment to Guildhall." The subject is carried through the entire window with the exception of the spandrels in the upper portion, in which are inserted the arms of the donor and the Saddlers' Company, of which he is a member. The designing and executing of the above has been entrusted to Messrs. Gibbs and Moore, of 89, Southampton-row, W.C.

#### WATER SUPPLY AND SANITARY MATTERS.

PORTSHEAD.—The success of the scheme for new waterworks here is said to be so far guaranteed that the land for reservoirs, headings, &c., has been purchased, and an agreement made with the Highway Board for laying mains in the roads. The works will be commenced at an early date, and, in the opinion of the engineers, will be completed before the middle of next year.

TAUNTON.—The Taunton Local Board of Health has adopted the Hillé system for the utilisation of sewage, which is in operation at Wimbledon. The principle of the process is essentially one of precipitation, supplemented by filtration or irrigation. The effluent is stated to be clear and rich in ammonia and phosphates, which are said to be entirely removed if filtered with animal charcoal, and the process of filtration through a bed of burnt ballast is stated to fit the effluent for running into a stream. The unfiltered effluent is available for irrigation, and the solid deposit is valued at from 26s. to £3. per ton as manure. It is not expected that the system will be self-supporting.

THE LIERNUR SYSTEM OF SEWAGE.—The Berlin *Tribune* states that Dr. Stronsberg, the eminent financier and contractor for public works, has just entered into a contract for putting the Liernur sewerage system into the whole of St. Petersburg for nearly £4,000,000. The war of systems had been going on for some time in their capital, and the chief engineer, Count Stuckenborg, was appointed to examine and report on the water flushing, Liernur, and pall systems. He spent some time in Holland, examining the Liernur system, and reported upon it in the highest terms, with the above result.

THE RICHMOND DRAINAGE.—At a meeting of the Richmond select vestry on Tuesday, a letter was read from the Conservators of the River Thames, informing



the Vestry that if the Conservators were satisfied that the vestry were adopting measures to prevent the flow of sewage into the Thames, they would not press for the penalties already awarded against the vestry, and would allow the proceedings now pending to stand over without prejudice, but the costs already incurred by the Conservators must be paid by the vestry. The Conservators declined to be parties advocating any particular scheme for diverting the sewage. It further stated that the Conservators had, on the recommendation of Dr. Letheby, adopted a standard of purity which they would require in the effluent water from the Richmond sewage works.

#### LAND AND BUILDING SOCIETIES.

**FOURTH CITY MUTUAL BUILDING SOCIETY.**—A general meeting of this Society was held at the City Terminus Hotel on Thursday week. The report showed that during the past year the amount received on investing shares was £8,671. 2s. 2d.; the repayments on advances amounted to £38,239. 18s. 5d., and the amount received on deposit was £49,682. 4s. 7d. The amount paid on shares withdrawn, and on account of investing shares, was £6,625. 18s. 9d. The amount advanced on freehold and leasehold securities was £34,324. 9s. 1d., and the amount of deposits repaid was £48,427. 4s. 1d. The balance to the credit of investing shares at the end of the year was £112,003. 13s. 2d. The balance due on advances amounted to £218,836. 8s. 8d. The rebate of interest on advances carried forward to future profit and loss account was £39,607. 18s. 3d.; and the balance to the credit of profit and loss account was £5,153. 13s. 2d.; out of which a dividend has been declared on all investing shares at the rate of £6 per cent. per annum.

**LEEDS PERMANENT BENEFIT BUILDING SOCIETY.**—The sixth annual meeting of this Society will be held to-night, and the following is an abstract of the report to be presented. There are at the present time 10,262 members holding 28,542-4-5ths shares, and 3,247 depositors, making a total of 13,509 open accounts. On November 1st, 1873, there was a balance in favour of the Society of £2,281. 9s. 2d. Out of that amount there has been paid or credited to all members entitled to participate, the sum of £1,425. 8s. 8d. The difference, £856.0s. 6d. was brought forward to the past year. Deducting this amount from the balance shown in the accounts, it leaves a net profit of £1,964. 0s. 5d. for the year ending October 31st, 1874. The directors recommend a division of 2s. 6d. per share to all members entitled thereto, which will absorb about £1,640.

**LEEDS PROVINCIAL BUILDING AND INVESTMENT SOCIETY.**—The twenty-fifth annual meeting of this Society was held on Thursday week. The increase in the receipts during the year is nearly £25,000. The directors propose to almost do away with the entrance fee of 2s. 6d. per share, and recommended that instead of a bonus of 2s. 6d. this year, a bonus of 2s. 11d. per share be declared, and credited to members who shall have continuously held their shares for two years prior to the first day of September, 1874; and that on and after the next quarter day of the Society's year, commencing on December 1st, 1874, the entrance fee on all new shares, instead of being 2s. 6d., shall be at the rate of 10d. for every share and 2d. for every one-fifth.

#### CHIPS.

Building in Italy would seem to be a peculiarly dangerous occupation. A new office is being erected in Rome for the Ministry of Finance. The other day a workman fell from the scaffolding and was killed, making the hundredth victim of accidents upon the same building.

A company is being formed for the erection of a new Town Hall at Snaith.

The foundation-stone of a new public school was laid at Lochmaben on Friday last. It will accommodate 300 pupils, and cost £2,000. Mr. Barbour, of Dumfries, is the architect.

The new church of St. Stephen, East Hardwick, Pontefract, was consecrated on the 25th ult. The building, which has cost £2,600, is in the Early English style, and comprises a nave, chancel, and two transepts. A belfry rises from the centre of the church. The architect was Mr. Davis, of Leeds.

Lloyds Banking Company are about to erect new premises at Rugeley. Mr. Walmesley, of Lichfield, is the builder.

Tenders have been accepted for the erection of a school at Cockermouth, for 230 girls (amounting to £1,535). The architect is Mr. W. H. Spaul, of Oswestry.

Mr. George Gutch, well known in the profession, died on the 21st ult. He was in the 84th year of his age, and was surveyor to four successive Bishops of London for the Paddington Estates, also District Surveyor for upwards of fifty years for the same parish.

"A Competitor" writes: "I should be glad to hear when the unsuccessful competitors for the erection of the new Farringdon markets are likely to have their drawings returned, as the decision has now been made known a long time, and we have had no official communication whatever, which I think we had at least a right to expect in return for our time and money."

## Our Office Table.

**CIVIL AND MECHANICAL ENGINEERS' SOCIETY.**—The first meeting of this Society for Session 1874-5, will be held this (Friday) evening, when the President, Mr. George Waller Willcocks, Assoc. Inst. C.E., will deliver his Opening Address. The following is a list of the papers to be read during the Session:—December 18, "The latest Application of Hydraulic Power," by Mr. Ralph H. Tweddell, Assoc. Inst. C.E.; January 15th, 1875, "Suspension Bridges," by Mr. A. T. Walmisley, Assoc. Inst. C.E.; January 29, "Reports of the Rivers' Pollution Commission," by Mr. W. F. Butler, Assoc. Inst. C.E.; February 12, "The Works of the Clifton Extension Railway," by Mr. G. J. Morrison, Assoc. Inst. C.E.; February 26, "On the Construction of Gas-holders," by Mr. J. A. Coombs, F.G.S.; March 12, "Trade Guilds and Trade Unions," by Mr. Charles H. Rew; April 9, "Mining and Quarrying," by Mr. J. W. Pegg, Assoc. Inst. C.E.; April 23, "Sewage of Towns," by Mr. R. W. P. Birch, Assoc. Inst. C.E.; May 7, "Railway Companies as Carriers," by Mr. R. H. Willcocks, LL.B.; May 21, "Self-Acting Machine Tools," by Mr. H. Ellis Hill; June 4, "Concrete Building Materials—Apparatus and Architectural Treatment," by Mr. Charles Drake.

**PLASTERERS' COMPANY.**—The Science and Art Department of the Committee of Council on Education, South Kensington, announce that the Plasterers' Company offer prizes to be competed for by students in metropolitan and provincial schools of art in connection with the department:—1st. A model in plaster, for an ornamental bracket intended to support a bust or statuette—for the best, £7. 7s.; for the second best, £4. 2nd. A design in monochrome, capable of being executed in plaster, in low relief, for the ornamentation of a doorway of any of the principal rooms of a dwelling-house—for the best, £8. 8s.; for the second best, £5. 5s. Designs in competition must be sent to the Science and Art Department in April, 1875, with the works required by the regulations in the Art Directory. The designs will be judged by the Art Department.

**OWNERSHIP OF SCHOOL-BOARD PLANS.**—At a recent meeting of the Aberdare School Board, the Chairman read a correspondence he had had with Mr. Barker, the new architect, relative to the property in the plans for the new school buildings. Mr. Barker held that the plans should be kept in his custody when done with, and raised the question of using them for other buildings, whereupon the Chairman remarked that he did not think they would be justified in using the plans for other purposes than the particular buildings for which they were meant. The opinion was entertained by Dr. Price that the plans were paid for by the ratepayers, therefore they became the property of the Board, and he considered that the architect had no claim upon them. Ultimately it was decided "That the architect should be permitted to retain the plans, but that at any time the Board required them for making alterations, they should have them upon the understanding that they be returned within a reasonable time; and an assurance on behalf of the Board was expressed by the Chairman that they should not be used for any other purposes than that for which they were originally intended."

MR. E. W. PUGIN has another action for libel in hand. This time he is prosecutor, and Mr. R. A. Elliott, publisher of the *London Lantern*, defendant. At the hearing on Monday last, at the Guildhall, Mr. Elliott was committed for trial, bail being accepted. What a friend Mr. Pugin must be to the lawyers!

**ADMIRALTY BUILDINGS IN CORNWALL.**—A Cornish correspondent says:—The Admiralty are building here three cottages for Coastguardsmen (near Penzance), and I wish to draw your attention to them, because in their plans they are transgressing what I hoped had become a prime law in such cases, viz., that no cottage for man, wife, and several children should contain less than three bedrooms. These three cottages will, with land, &c., cost the country, say, £1,500, and in two of them there are only two bedrooms; the third has a third room, of cupboard dimensions and without a fireplace. It does not admit of decency. Do, if within the scope of your journal, bring this state of things before the public. The rooms, too, are very small; 12ft. by 9in. is the front living room, and, therefore, I expect that

is the dimension of the largest bedroom. One family which, I presume, will have the house with the extra room, consists of parents and six children. The other two families bring the total to 19 persons, and as they are young and increasing families, they will have to illustrate in a Government building all the evils of overcrowding. I hear the reason for building them thus is that all other Coastguard buildings in this district are on the same plan, and to alter them would lead to jealousy!

#### CHIPS.

A number of improvements are about to be carried out on the Sanitary establishment at Harrogate, from the designs of Mr. Hiscoe, architect.

A fine of 40s., with five guineas cost, was inflicted on the Crystal Palace Gas Company last week, for discharging noxious matter into a public sewer. For the company it was alleged by Mr. Midwinter, assistant to Dr. Letheby, that he had analysed the fluid discharged, and found in it less sulphuretted gas than in the main sewer. Since the information was taken a great abatement of the nuisance is said to have taken place.

The foundation-stone of a new Methodist chapel at Shucknell Hill, Herefordshire, was laid on the 16th ult. Mr. T. Davies, of Hereford, is the architect, and Mr. Jay, of Withington, the builder. Cost £200; accommodation provided for 100 persons.

The *South London Press* states that the Midland Railway Company are about to erect a "monstrous" goods depot in the Walworth-road, extending from the Chatham and Dover Railway bridge nearly to Amelia-street. It is stated that all the property required has been purchased either by agreement or arbitration. The new goods depot will have a long frontage to the Walworth-road, and will be contiguous to the Coal depot belonging to the Midland Co.

On Saturday a new school, which has been erected at Lindley, near Huddersfield, was opened. The building is two stories high. On the ground floor there are spacious, well lighted and heated classrooms; and on the upper floor there is an assembly-room, capable of seating 950 persons. The school was designed by Mr. E. Woodhouse, Bolton, architect.

John Hibbert, of Manchester, lightning conductor manufacturer, has issued a notice to his creditors of liquidation by arrangement.

Smallhythe Church, near Hastings, which is in a very dilapidated condition, is proposed to be restored, at a cost of about £500.

Mrs. Edenborough, widow of the late Colonel Edenborough, of Thrift Hall, Waltham, has offered completely to restore the interior of the east end of Waltham Abbey Church.

A new Board school is about to be erected at Rillington, Yorks, from designs by Messrs. Gibson and Son, of Malton.

The painter Franz Gaul, father of the two eminent painters, Franz and Gustav Gaul, died suddenly last week in Vienna.

A new Roman Catholic chapel at Aboyne, Aberdeenshire, was consecrated on the 26th of last month. The building includes a presbytery, and is built from a very neat Gothic design by Mr. Ogilvie Clerk of Works to the Marquis of Huntly. The contractors were Messrs. J. Burgess and Son, Aboyne, masons; Messrs. W. Duguid and Sons, Ballater, carpenters; Mr. J. Wink, Aboyne, slater; Mr. T. Davidson, Banochry plumber; and Messrs. Mitchell Brothers, Ballater, plasterers.

The foundation-stone of a new school in connection with the Episcopal church at Ballysillan, near Belfast, was laid on Saturday.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SHELVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB and SON,  
Makers to the Bank of England,  
57, S. Paul's Church-yard, E.C.  
And 68, S. James' street, S.W. [ADVT.] } London.

#### MEETINGS FOR THE ENSUING WEEK.

MONDAY.—INSTITUTION OF SURVEYORS.—"Agricultural Geology." (South-western district). By Mr. W. Sturge. 8 p.m.

SOCIETY OF ENGINEERS.—On "The Forms and Construction of Channels for the Conveyance of Sewage." By Mr. John Phillips. 7.30 p.m.

TUESDAY.—INSTITUTION OF CIVIL ENGINEERS.—8 p.m. ANTHROPOLOGICAL INSTITUTE.—(1) "Notes on some Tumuli and Stone Circles near Castleton, Derbyshire." By Dr. R. Oke Pennington. (2) "Some Account of a Leaf-wearing Tribe on the Western Coast of India." By Mr. M. J. Walshouse. (3) "Further Notes on the Stone Monuments of the Khasi Hills." By Major Godwin-Austin. 8 p.m.

WEDNESDAY.—SOCIETY OF ARTS.—On "The Protection of Buildings from Lightning." By Dr. R. J. Mann. 8 p.m.

BRITISH ARCHÆOLOGICAL ASSOCIATION.—(1) "Domestic Appliances." By Mr. E. Roberts, F.S.A. (2) "Money-boxes." By E. Roberts, F.S.A. 8 p.m.



## THE BUILDING NEWS.

LONDON, FRIDAY, DECEMBER 11, 1874.

## VENTILATION.

THE proper supply of fresh air to rooms in which persons are congregated has of late years received considerable attention, and various plans have been suggested and tried for securing that desirable object; nevertheless, there are but few buildings in this country, either public or private, in which the ventilation can be said to be satisfactory at all times of the year. This failure arises partly from the great variations in the temperature and atmospheric conditions to which we are subjected, so that a system which will insure a perfect ventilation one day may be found quite inadequate on the next. It may, however, be attributed mainly to the subject of ventilation being undertaken by persons who have but little knowledge of the scientific principles involved, whose methods take only one particular view of the question, and ignore every other; some systems being devised for the simple purpose of extracting foul air, without regard to a proper and efficient supply of fresh air to fill its place, whilst others attempt to force fresh air into a room without providing means of extracting the vitiated air. We therefore propose briefly to consider the known laws of nature and the results of scientific research which bear upon the subject of efficient ventilation.

Atmospheric air, the inhalation of which is essential to the life of every animal and human being, is composed of one volume of oxygen gas mixed with four volumes of nitrogen gas, the same proportion between these two gases being found to exist whether the air is near the sea-level or at the top of a lofty mountain. There is, however, another gas always present in small and variable proportions, namely, carbonic acid gas, which is a compound of oxygen and carbon; the largest quantity of this which has been found in the external atmosphere is a little over 6 volumes in 10,000 volumes, the quantity being rather greater in summer than in winter near the earth's surface, and also greater in the night than during the day. Although much heavier for a given volume than either of the other component parts of air, carbonic acid, nevertheless, pervades it nearly equally, owing to the law of the diffusion of gases, by which they intermingle independently of the action of gravity; the rate of diffusion is inversely as the density, consequently carbonic acid diffuses more slowly than lighter gases, and when generated in large quantities it remains for some time near the surface of the earth or the floor of a room, before it becomes equally diffused through the surrounding atmosphere.

The proportion of carbonic acid found in the air of dwellings and public rooms where persons congregate greatly exceeds that found in the external atmosphere. This arises from the fact that human beings exhale from three to four per cent. of carbonic acid at every breath; and the actual quantity of that gas given off by each adult averages two-thirds of a cubic foot in an hour. Carbonic acid gas cannot be inhaled by any living being in large quantities without producing death; and even when the proportion amounts to one per cent. of the whole atmosphere in a room, the effects on the health are very injurious in the course of a few hours; when the proportion is much less than this, it can be inhaled with impunity; but, for a healthy atmosphere, the quantity ought not to exceed one or two in 1,000 volumes.

Another source of carbonic acid is the combustion of fuel, and the methods of producing artificial light by means of candles,

lamps, or gas. An ordinary gas-jet burning openly in a room will produce as much carbonic acid gas as an individual, and in some cases more, the quantity depending on the amount of gas consumed, and the nature of the burner; in an argand burner the combustion is most perfect, and therefore the greater part of the carbon vapour contained in the gas is oxidised and converted into carbonic acid; but where the combustion is less perfect, a large part of the carbon passes off in smoke, and condenses on the walls and ceiling of the room. In the combustion of all fuel, this gas is generated; and if the fire is an open one, a certain quantity will find its way into the apartment unless the draught is very great.

There is another gas of a much more deleterious nature which is sometimes found in the air of ill-ventilated apartments in which a number of persons have slept together, called carbonic oxide. When charcoal or coke are burnt, the lambent flame at the top is carbonic oxide in a state of combustion, by which process it is converted into carbonic acid. A mixture of one per cent. of this gas in air is sufficient to produce death in the person inhaling it, so that every trace must be removed by a good supply of fresh air.

Besides these gases, there is also a considerable amount of aqueous vapour given off from the bodies and lungs of persons, as well as generated by the combustion of gas or other artificial lights; and a certain quantity of organic matter and effluvia is given off from the human body, which tends greatly to the vitiation of the air in a crowded room.

The object of ventilation is to reduce the proportion of carbonic acid gas within the limits of perfect safety; to remove all the carbonic oxide that may have been generated, as well as all organic matter and effluvia; to reduce the amount of aqueous vapour without rendering the air too dry; and to prevent the temperature of the air from rising higher than is agreeable to the occupants of the apartment, which in this climate is about 60°. of Fahrenheit.

In public halls, churches, or other places in which large numbers of persons are congregated for a few hours at a time, the removal of carbonic acid gas from the air is the chief matter for consideration, and sufficient fresh air must be supplied in order to prevent the proportion of that gas exceeding 1 part in 500, or 2 in 1,000 of the whole air in the room. Now, since each person may be considered as giving off 2-3rds of a cubic foot of carbonic acid in an hour, this quantity will give a proportion of 2 in 1,000 to 333 cubic feet of air; consequently, in order to maintain this proportion of the gas, a supply of that quantity of fresh air will be required every hour, or about 5 cubic feet per minute, which is the usual allowance for ordinary rooms. For example, if we suppose 1 square yard of flooring to be allowed to each person in a public hall or church, a height of 34ft. will just supply 600ft. of air to each, and the air therein will last the assembly for one hour without requiring to be changed; at the end of that time there will have been 2 cubic feet of carbonic acid in 1,000 added if no fresh air has been admitted, consequently a change in the air of the room will then be required in order to prevent this proportion of carbonic acid being exceeded. If, however, gas-lights are burnt in the room, we must consider each burner as equivalent to an additional person. When the temperature of the room is high, there will be a larger proportion of carbonic acid in the upper part than in the lower on account of the ascending current: thus it was found by Dr. Roscoe, who has experimented largely on the air of rooms, that in a crowded theatre in which many gas-lights were burning, the quantity of carbonic acid at a height of 4ft. above the stage was .26 per cent., and at 34ft. it was .32 per cent. In ordinary cases, however, it is found that the air is nearly homogeneous, as the law of diffusion causes the gases to mix rapidly with each other.

In rooms where putrescent organic matter is present, as in hospitals, barracks, and other places, the quantity of fresh air supplied to each individual must greatly exceed the amount provided for ordinary rooms, 20 cubic feet per minute for each person being required in order to keep the atmosphere of the room healthy and fit for inhalation.

The admission of external air into a room for the purpose of ventilation can be effected either by natural or artificial means; in the former case, openings are made in the walls, ceiling, or floor of the apartment, and the air passes in and out of its own accord; if the air in the room is warmer than that outside, it will be lighter, or more rarefied, and consequently the weight of the colder air will cause it to rush in until the balance of density is established. If, on the contrary, the air of the room is colder than the external air, an outward current will be produced through the openings in the lower part of the room, a fact which may be readily perceived by a person standing at the door of a cathedral in hot weather. The presence, however, of a large audience generally raises the temperature of the room above that of the external air, even in the hottest weather; but unless there is a considerable difference of temperature there will be but little ventilation, as the rate of the current is proportional to the difference between the temperature of the external and internal atmosphere; so that in winter we are apt to get too rapid a current and too much ventilation, and in summer too little.

It therefore becomes necessary to employ artificial means for changing the air in all large rooms, so as to be independent to a great extent of the state and temperature of the external air. This is generally done by rarefying the air in a flue or extracting shaft by means of a fire burning therein, so as to draw the vitiated air out of the room, and the fresh air can be admitted wherever it is most convenient at any temperature that may be advisable, either by passing it over heated surfaces if too cold, or over ice, jets of water, or cold surfaces if too warm. The height, size, and aspirating power of the extracting shaft must be regulated by the size of the room and the quantity of fresh air required in a given time; for if too powerful it will cause an inconvenient draught through the room, and if too weak will not change the air with sufficient rapidity. Fresh air is usually admitted by perforations at the bottom of the room, and the foul air extracted near the ceiling; the openings for admission of air should be small but numerous, so as to distribute the air as quickly as possible, and should be a few feet above the floor, in order to avoid carrying up the dust which accumulates at the lower part of the room.

In order to apply successfully the system of ventilation by "aspiration," as above described, we must know what size the ventilating shaft ought to be by which the foul air is extracted from the room, so as to keep up a sufficient supply of fresh air. It has been ascertained that air at 40° expands 1-500th of its bulk for every additional degree of heat, so that if the air in the extracting flue is heated to 540° it will occupy twice the space it did when at 40°, and the air of the room at 40° will rush into it at half the rate that it would do into a perfect vacuum; and if the shaft is heated to 290° the velocity will be the fourth of that into a vacuum, and so forth. With a shaft 140ft. high the velocity into a vacuum is 420ft. per minute; it will, therefore, be 105ft. per minute with the air therein at 290° or 250° above that of the room. If the shaft is only 70ft. high the velocity is again reduced one-half, or to 52½ft. per minute.

From this it is seen that a flue having a sectional area of 2 square feet will remove 105 cubic feet of air from the room in one minute, or change the air vitiated by 23 persons, and that an area of 20ft. in the flue will ventilate a room containing 230 persons,



the extracting shaft being 70ft. high, and the air therein at 290°; and by doubling either the height of the shaft, or the temperature, ventilation is provided for 460 persons. The same area of opening must be provided for entrance of fresh air as for the extraction of foul air, and the air that is admitted should be allowed to pass through a warming (or cooling) chamber before entering the room, as the plan of warming by means of heated surfaces in the room itself is apt to cause unpleasant draughts of cold air, and also the organic matter exhaled is deposited on the heated surfaces, and gives off an unwholesome smell, which tends greatly to vitiate the air.

In some cases, as cells of prisons and wards of hospitals, the system of ventilation by "impulsion" is advantageously employed, which consists in driving warm or cold fresh air into the room near the ceiling by means of a revolving fan, and extracting it by openings near the floor leading to an aspirating shaft. By this method the supply of air and temperature of the room can be regulated to the greatest nicety; the fresh air reaches the occupants without being mixed with the dust which accumulates near the floor, and all heavy impurities and exhalations are at once removed from the room without danger of being inhaled.

Dry brick walls conduce to the ventilation of a building, as the carbonic acid which collects inside will gradually diffuse through the brick until the balance is restored between the external and internal air of the proportion of that gas. In damp and new walls this diffusion does not take place, to which circumstance the unhealthiness of new houses is partly attributable.

#### HINTS ON CHAPEL-BUILDING AND CONSTRUCTION.\*

WE alluded in a recent impression to the work of the Chapel-Building Society in regulating and improving the structures of the Nonconformists, and we now revert to a few of the suggestions contained in their "Hints," which may be of practical value. Allusion has already been made to the value of hollow walls, and the recommendation that if these are not constructed, battening should be used inside, is one, we fear, that will hardly meet with the notions of "correct" church architects. Be this as it may, the suggestion cannot be pooh-poohed, some such interior casing being absolutely necessary in all solid brick-wall churches for dryness and warmth. Another fact, too, should be remembered, that boarded or battened walls can be more effectually warmed, and far more economically—a consideration not to be despised by churchwardens in cold weather, when coals are at famine price, and a shivering congregation is to be at least comfortably accommodated. The chilling effect of plaster on damp walls, while it necessitates a great heating power, must be always cooling the warmed currents and sending them in unpleasant draughts upon the heads of the congregation. Speaking of roofs, lead of 6lb. to the foot is recommended for valleys, and 5lb. lead for hips and flashings. Copper, though more durable, is costly, which precludes its use, and in no case should copper and lead, zinc or iron come together, as a chemical action sets in fatal to the metals. Lead on oak boarding, too, is acted upon by the acid in the wood. For the general covering, "Blue Staffordshire tiles or stone tiles of good quality" are mentioned, though Westmoreland, or if too dear, Carnarvonshire, slates form the best covering, the first having a more agreeable colour. Copper or composition nails are best for fixing. Coming to the timbers, sundry directions are given, more or less of practical value, to the uninitiated builder. For instance, the distance between

main principals should not exceed 12ft. without intermediate trusses; and no truss should be placed over windows. "Purlins should not exceed 9ft. on the slope," and they should be scarf-jointed, *not tenoned* or halved into principals. The latter point is sometimes transgressed against, and may be usefully enforced. As regards the strain imposed for slated roofs, a breaking pressure of 100lb. per square foot on the slope is given as the greatest pressure the timbers should sustain. The advantages of inner ceilings cannot be too strongly advocated as the best defence against extremes of external temperature. This can always be managed by ceiling at the collar level, and by plastering underneath instead of between the rafters, so as to allow an intervening air stratum. Besides this protection a layer of felt under slates should always be introduced. Boarded ceilings are open to objections: the joints open, and air-currents are admitted. Some useful remarks upon different forms of roof trusses, their relative economy, and constructive merits, are appended; the diagonal-braced, collar-tied, curved-rib, and other forms of framing are discussed with some practical observations. Collar roofs—when the collar acts as a tie—are generally defective; the principals have to sustain a bending strain below the collar, and unless the rafters are strutted from the walls, or are stiffened by curved tie-ribs secured to a king, and brought down the walls a little distance, they are not to be recommended. Few modes of framing roofs are more economical or effective than the cross-brace. A king-rod at the intersection of the diagonals assists to prevent the strain or wrench at that point, and by bracing the truss up makes the upper ends of the diagonals struts to support the rafters. Hammer-beam roofs, unless very carefully constructed, and the curved braces made ties and securely fixed to the collar and hammer-beams, are costly and defective. The latter have a tendency to drop unless the curved braces are made ties between them and the king-post, but this is the difficulty when we deal with curved pieces. Sometimes it is effected by spandrel filling-in, but the expense of this is against it.

Coming to floors, to secure ample stiffness and prevent loss of elasticity, the timbers are recommended to be able to take a distributed load of 400lb. per square foot to break them; where the floor has fixed seats one-fourth less may be taken. As regards passages, 3ft. to 4ft. wide is allowable, and they should be on the same level as the floor; passages in a direct line with the pulpit are to be avoided. The arrangement of doors and lobbies should be such as to facilitate the speedy egress of the congregation; inner doors should open outwards. In staircases, well-holes and winders are objectionable; teak treads, or Hawkesley's patent treads, are better than ordinary deal, which invariably have a poor appearance. The value of double glazing to windows is mentioned. We only wonder why architects are so slow in adopting these valuable means of comfort, thereby also reducing the cost of warming our churches and public buildings. It may be safely said that one-half the heat is wasted and becomes lost by radiation.

Pulpits have generally been the unredeeming features in places of worship. To give a pulpit the position it should occupy for voice and sight, and, at the same time, to keep it out of the main vista, has been a problem which has often baffled the architect's resources. Either its height has been too great, or it has been made to block out the end of the building in an objectionable and obtrusive manner. Then its shape has generally been of the least artistic kind. Preaching-boxes, or "three-deckers," are terms of reproach that have been given to this very inartistic piece of furniture. The pulpit should be fixed as low as the voice and command of the preacher will allow, while it can always be made more spacious

than usual. Its position should always be determined on the plan before the seating on the ground-floor and galleries. A pulpit attached to a wall or pier, and either projecting therefrom or opening out of an arched recess or niche, seems to us to be a far preferable manner of treatment than an isolated erection. The Communion-Table generally is made to stand in front of the pulpit, in Nonconforming churches, upon a raised dais about a foot or 18in. above the general floor level, though this elevation is not always considered desirable.

As to seats, the dimensions recommended are 33 to 36in. height of back, distance from back to back of seats not less than 2ft. 6in., though 3ft. is preferred; space for each adult from 18 to 20in.; for each child 14in. A slope back of 2 or 2½in. is comfortable. Seat-boards should also slope. "Pews or benches for four should be more numerous than those for six or eight." A pew for deaf people with gutta-percha tubing is a good suggestion. We have already alluded to the position for organ. A few hints on warming and ventilation are given, though, as there is nothing original in them, we may here casually remark that the Gurney or gill stove, placed in a brick chamber below ground, with a flue carried round the church, having gratings for the hot air to escape at intervals, and with proper inlets for fresh air to the hot chamber, seems to meet all the requirements of the case, is less expensive and less liable to accident than hot-water circulation. As regards admission of fresh air, internal hoppers are generally used; cheeks of glass are preferable. Vertical wall-flues leading to inlets near the window-cills with valved gratings may be adopted with greater advantage, taking care that the currents are directed upwards and are properly broken and dispersed. Ventilating appliances—as Watson's, Mackinnell's, and Muir's ventilators—may be employed; the syphon principle admits the fresh cool air and extracts the warm and vitiated, and any trunk divided by a diaphragm in the centre has a double action, caused by the relative densities of the cold and warm currents, and may be used with advantage. Ventilating openings, with trunks having outer caps or louvred dormers, to protect them from the wind, may be employed between the inner ceiling and the ridge or roof surface. These openings should have lids or valves with lines to open or close. Every corona or gas-burner should have directly over it one of such ceiling openings. It is strange, where towers exist, these adjuncts are not utilised as extraction-shafts. What could be easier than to lead all the openings from ceiling to tower or spire by trunks, and, by the aid of gas-jets, create a sufficiently strong current to carry off the vitiated products of respiration and combustion?

#### HINTS TO STUDENTS.—III.

WITH the intention of making this short series of articles as complete, useful, and suggestive as possible to students and architects in practice, we propose to bring within a small compass the range of those subjects which bear collaterally on architecture, treating each under the aspects of *Art-practice*, *Scientific Principles*, *Method*, and *Authorities*. The first will be a short résumé of methods in use, the second the principles which are involved in them and their correlation to one another; Method will be an effort to enunciate certain modes of practice on a more rational basis, while under Authorities we hope to assist the student to pursue each department as his inclination or taste may lead, and supply, moreover, a want which our experience has found to be increasing every day—namely, a list of authorities on the multitudinous topics of architectural practice, and thus in some way meet the demand for the ever-recurring question, "Can you recommend me suitable works on such and such a matter?" We believe

\* "Practical Hints on the Erection of Places of Public Worship," London: J. Snow and Co.



half a student's and young practitioner's time is lost in hunting for suitable books. Text-books and cheap serials pour forth in abundance, authorities may be out of print or prolific in certain departments, but the student is bewildered by the very *embarras de richesse*.

We have shown the dangerous specialism now rampant in every branch of knowledge, especially architecture; its tendency to produce a race of miserable thinkers and generalisers; and, above all, sets of dogmatic teachers and egotists. While we believe every man should study one thing well and thoroughly—that for which he may have an aptness—we think he should know a *little of all*. We mean here, of course, those collateral topics which act and react on his profession. A smatterer of various arts we have no faith in. As Bacon says, the most important kind of education is that of the “*relative values of knowledges*.” All the benefits to be derived from education and self-study may be summed up in this sentence; every one of us should know what knowledge is the most useful, the most immediate and direct in its bearing upon our wants; for it is utterly preposterous for a student to learn the syntax of language before its words, or to become skilled in the mere symbols and formulæ of mathematics before the simple facts of magnitude, number, or the laws of geometry and mechanics are acquired. There is a great deal of misspent energy here. The fault has mainly rested with our schools, wherein the higher mathematics have been taught, to the exclusion of plain truths and physical laws. The ordinary analysis should certainly be the groundwork in mathematics; and if the genius of the student needs a higher knowledge, he can pursue it after the more immediate demands of his avocation have been satisfied; to do more at first, is to waste precious time over a study for which he may have no inclination or necessity hereafter. The method of teaching has been, so far, like that of designing, in proceeding from general formulæ to particular truths. Classes of facts have been vaguely generalised, and the general deduction is taken as the starting-point to the facts themselves, without any consideration of the relative values of the facts, or their bearing upon our wants. In this way we learn much more than is necessary—at least we learn a good deal that we might better have been without. Instead of reaching our requirements by the “line of least resistance,” to borrow a term used by Professor Moseley, we go over twice or three times the length of ground with so much less actual energy for our work.

What we require is to know the readiest route to a given subject, and this can only be attained by beginning with actual facts and properties, and deducing therefrom our own generalisations. We have science to shorten our paths and to give us methods and principles already derived through experience, and where these fail, actual experiment must be resorted to. But although science will shorten our journey considerably in the attainment of general principles and laws, it will help us but little in the practical arts unless we find some points at which our acquired principles will touch them. A general principle or rule is good in its way, but it is far more valuable to us when it makes us skilful adapters, designers, or operatives; when we know *how* and *when* to apply them. A chemical student versed in the nomenclature and formulæ of his science, but without the technical and manipulative processes acquired in the laboratory, is no chemist. An engineer or architect, who though an adept at algebraic equations or learned in the vocabulary and classification of style and general science, may be, for all his learning, a mere visionary or theorist, as far off from the actual problems of his art. What the points of contact should be at which art-practice and scientific theory should be made to touch may very readily be laid down as far as architecture is concerned. Unquestionably those matters having reference to

health and comfort should come first, *durability and strength*, and *artistic refinement*, next. This would be the order of absolute utility. Facility of working, economic adaptation are technical modes of production equally pressing. The former are the ends proposed, the last the means. Now the means should subserve the ends as far as practicable, and therefore by analysis of the ends proposed, we must first get at the most desirable results. So far our studies must be deductive. We must conceive a thing as a concrete embodiment, and this is the difficult step to take uninfluenced by what has been done before in Art. But we may meet the difficulty half-way, by knowing tentatively, or from experiment, what facts are most conducive and helpful to that result. Science will help us greatly to form and correct our ideas, because she can present to us the aggregates of experiments precise enough for most of our wants. We can then reduce our labour to this. Let the ends proposed be scientific principles, but let us work to those principles by constructing synthetically the actual experiences of art as taught in the workshop. This is just contrary to the way in which we have been taught to regard the matter. The principles have been worked *from* instead of *to*, and while descending to the requirements of each special work we have lost our way; “forgotten the tack” to use a nautical phrase, because our science has not condescended to come along with us, and confront the actual materials we work in, and their complex nature. For example, our efforts have been constrained within certain dicta as regards the important matter of ventilation. We are taught to know certain laws of the densities of warm and cold currents of air, and we have been led to adopt a certain arrangement of openings for inlets and outlets; but as to the actual conditions of each special case we are often in the dark, and grope about committing egregious blunders under the name of science. In every art some definite end must be proposed as a goal, and the more certain in its result that end is, so will the work be successful or agreeable. Now the ends proposed by science must be the most successful, as they are the most precise, and lead to the most pleasing results. The pursuit of art by the other process has been notoriously misleading. Few artists have ever been made by making them scientific first; but give a man a block of stone or some wood and tools, and he will perhaps work out an astonishing result. And why is this? Because he works experimentally and places before him an ideal that he knows by experience will give the result, more or less approximately. But let us place before him a more certain result, and we considerably lessen his labour, for he works to it more directly, and by the aid of the light it throws on his path.

Having so far cleared the way, we shall now be in a position to discuss the operations of building, beginning with soil and excavation, through the various arts of the mason, bricklayer, carpenter, smith, plasterer, and decorator.

#### ITALIAN SCHOOLS OF ART.

ITALIAN art is to that of other European schools what Athens was to Greece. The very instinct of art seemed to have taken deep root in a land favoured by nature, and which history had rendered classic. But there was still another cause which gave to art in Italy so vigorous a vitality. She was by nature sensitive and æsthetic to a high degree. Her mountain fastnesses had checked the deluge of the barbarians after the fall of the Roman Empire; thus the traces of ancient civilisation had been preserved to her, while the freedom of her municipal system, and the independence of her republican institutions, all aided to secure to art just those conditions most favourable to its progress. Rich and powerful commonwealths, governed by eminent citizens, sprang into existence, and became the foster-

ing centres of art. Thus Venice and Genoa acquired great power and influence; their ships covered every sea, and “Italian factories rose on every shore.” Again, the influence of the Church was a powerful incentive to art; as Macaulay observes somewhere, the Roman Church has enriched sculpture and painting with the loveliest and most majestic forms. Of all religions it is the most poetical; it has united the awful doctrines of the Christian faith with the “fair humanities” of ancient superstition. Its legends, martyrs, and saints vie in interest with the mythological fables of Greece, and have become the finest themes of religious art.

Under these circumstances we gladly welcome Lady Eastlake's new edition (London: John Murray) of the “*Handbook of Italian Painting*,” based upon the work of Kugler, and originally edited by the late Sir Charles Eastlake. The value of the work is attested by the fact of its having already passed through three editions since 1841, when the first English translation of Kugler's handbook appeared. We have in the new edition the results of those accessions and additions to the subject which the last twenty years have accumulated, besides the valuable notes of Sir Charles Eastlake. The work is divided into six books: the first treats of Early Christian and Byzantine art; the second, of the Romanesque or art of the Middle Ages; the third, fourth, and fifth books of the various stages of development exhibited by the masters of the fourteenth, fifteenth, and sixteenth centuries; while the last book deals with the masters of the seventeenth and eighteenth centuries, and the second decline, embracing the Eclectic schools, the Naturalists, and the names of the latest Italian and living painters. As an exhaustive summary of Italian painting, enriched by well-drawn outline illustrations of the most important works, we can recommend the work to all students of art. Passing over the first two books, which discuss the earlier development of art from the Roman, the allegorical character of Early Christian representation, the simple and unaffected art of the catacombs, the introduction of painting in tempera and mosaic in the Basilicas, under the auspices of the New Faith—all very interesting topics, and treated with a completeness their importance deserves—the eleventh century commenced the true development of Italian art as we are accustomed to regard it. It was at this time that the native impulses of art began to develop themselves untrammelled by previous forms. The Byzantine style, which had previously held sway under the influences of the Eastern capital and the emigration into Italy of Greek artists, was beginning to be amalgamated with the native Longobardian. The reinstatement of the ancient capital by the almost full-grown Roman Church began the change, which was further advanced by the growing prosperity of the free towns. An independent style of art was formed which attained its maturity by the thirteenth century. “I must be admitted,” we are told, “that the Italian examples of the eleventh and twelfth centuries fall short of those of the same period in the North, which, considering the confusion of all the political relations of Italy, and the comparative prosperity of the countries on the other side of the Alps, need not surprise us.” How far, however, this may be true or not, rests upon no better evidence than a few MSS. in the Vatican and elsewhere, which show feebly-drawn outlines and worse colouring, leanness of proportion, Byzantine inanimation, and some of its later faults, combined with evidence of a new power. Drawing and artistic execution are defective in most of the earlier examples of this crisis, though occasionally a release from the rigid restraints of the Byzantine school is observed, as in the mosaics of Sta. Maria in Trastevere at Rome, (A.D. 1139-1153). The mosaics of the tribune of the Basilica of St. Clemente, belonging to



this period, show the decorative and architectural character of the painting of this time. The semi-dome has a gold ground, filled with well-arranged branches of a vine, a crucifix springing from the centre, with doves; the Virgin and St. John the Baptist occupy the sides, the roots of the vine being fed by the four streams of Paradise, diversified by peacocks and stags, while between the boughs of the vine are birds, and figures of the Fathers, and below the semi-dome the usual thirteen lambs. By the thirteenth century, under Innocent III., Byzantine tradition appears to have died out, as regards single works. The carved doors of St. Sabina, on the Aventine hill, is cited as an instance of this. Art, in fact, seemed to be resorting to the simple forms of Early Christian date. Venice, more independent of ancient traditions, shook off the Byzantine stiffness. Thus, in the great mosaics of Torcello Cathedral, representing the Resurrection and Judgment, a greater richness of form and thought is shown; so, also, to a still greater degree, in the cupolas and lunettes of the vestibule of St. Mark's, Venice, where a Byzantine elegance and neatness is seen excelling previous works, and showing the influence of a fresh Western or Romanesque spirit, in which some return to round and natural forms is evinced. Greater expression, and flowing instead of rigid folds in drapery, are characteristics in the figures of this young art, and the mosaics just described, and those in the chapel or baptistery, are considered good examples of the change. The same improvement took place in the art of Lower Italy. Breadth and feeling for human forms took the place of the Byzantine conventionalisms, as multiplicity of folds, &c. The ceiling and wall-paintings in the baptistery at Parma are important Lombard manifestations of the art, A.D. 1230; the uppermost compartments have the Apostles and the symbols of the Evangelists; in the next the Prophets, the figures of Christ with the Virgin and John the Baptist occupy a niche; while the third row between the windows, are scenes from the Baptist's life, and two saints next each window. A Byzantine hardness of manner is united with a powerful and lively colouring, and an excited and impassioned action. The family of the Cosmati belonged to this period, and were eminent in mosaics and paintings, in the cathedrals of Civita Castellana, at Subiaco, and Anagni. From these facts it will be seen that the Tuscan school of painting arose simultaneously with the marked change which displayed itself in opposite parts of Italy, and not of its own isolated efforts. It is asserted that "the later Tuscan artists of the thirteenth century remained and continued in many external respects far more dependent on the Byzantine school than those of contemporary date in Rome, though they surpass these latter in thought and invention." The wall-paintings in the church of St. Pietro in Grado, between Pisa and Leghorn, are placed first in the list of the works of those local painters who began to show a feeling independent of the Byzantine dominion under which they lived. Guido Gratiani (or da Siena), in a large Madonna picture in St. Domenico, Siena (1221), exhibits a gracefulness in his figures, though still fettered by the barbaric manner of the age. Jacobus is another painter in whose works the latter influence is less noticed (see the mosaics in the altar-tribune of St. Giovanni, at Florence). Other mosaicists, concerned here are Andrea Tafi, Apollonius—Greek artists, though it is questioned whether a Venetian Byzantine art did not exist independent of Greek artists. Under Innocent III. the Church of Rome reached a high degree of splendour; religious enthusiasm ran high, the devotion of St. Francis of Assisi inspired rising artists; the true nationality of Italy commenced, a literature in the native tongue took root, a loftier ideal was realised; and Art, temporarily at least, emancipated, began to vie in conception with Classical ideas. Nicola Pisano born about 1300) was one sculptor who

showed this better taste—his followers soon lost the style in a mannerism essentially Gothic. Painting was little affected. Giovanni, of the family of Cimabue, is regarded as the founder of modern Italian painting. Two large Madonnas, one in the Academy, and the other in St. Maria Novella, are ascribed to him, the latter displaying a more natural conception of form. Cimabue, in the large wall-paintings in the upper church of St. Francesco, at Assisi, displayed the earlier germs of Florentine art. The decoration of this church "must be regarded as one of the most important circumstances in the historical development of modern painting;" the building is peculiar: two churches are built one over the other, the lower one having originally been the sepulchral church of St. Francis. Here Cimabue was employed to complete the series of wall-paintings begun by the monk Jacobus, in the early part of the thirteenth century—works which exhibit an avoidance of the repulsive stiffness of the Byzantine school. The mosaics in the semi-domes of the tribunes of St. John Lateran and St. Maria Maggiore, Rome, by Jacobus Toriti (1287-1292), show a decided and more elevated sentiment. The latter example is a fine composition, and is surpassed by no contemporary work. Christ enthroned, with the Virgin, occupies a centre circle with gold starred ground, supporting which on each side are seen adoring angels, kneeling and flying, on a gold ground, SS. Peter, Paul, John, Francis, and Anthony advancing at the sides. The upper portion of the dome is filled with vine branches in scroll-work, with symbolic animals. An illustration of this fine mosaic is given, p. 113. Contemporary with Cimabue, Duccio occupies a conspicuous place in the revival of art. He even goes beyond Cimabue, though his excellences rest on small works. The great Giotto followed. Hitherto traditional forms had been more or less followed; now the artist aimed at an intelligible expression; his theme, and not his individuality, was the object. A combination of the subjective and objective powers became the perfection of religious art, the former revealing the individual mind of the artist, the latter his appropriation of external forms. From this time the subjective mode of conception prevailed. Tuscany maintains its place, the principal centres or schools being those of Florence and Siena. The Florentine school evinced a vigour and liveliness of thought; the relation between the earthly and spiritual was allegorically conceived. The Siena school, on the contrary, adopted more of the traditional forms. One showed richness of composition and thought, the other grace in their single figures. Giotto stands conspicuous as the first great didactic painter of the period. The son of a poor labourer, Bondone, he was born at Vespignano in 1276, and died at Florence in 1336. His first training in art was acquired in the well-known church of St. Francesco at Assisi, where he assisted in the frescoes of the upper church illustrating St. Francis's life. His matured works adorn the lower church of Assisi, and consist of four triangular compartments in the groined roof, representing the vows of the order—Poverty, Chastity, Obedience. Here his dramatic power is well shown, and illustrations of the panels are given in the "Handbook." In Florence, in the chapel of the Bargello—the Podesta palace, are other examples of his work. Dante was a friend of Giotto, and in his immortal "Divina Commedia" he thus alludes to the great painter:—

"Credette Cimabue nella pittura  
Tener lo campo; ed ora ha Giotto il grido,  
Sicché la fama di colui oscura."

In the Bargello there is a portrait by Giotto of the great author of the Divine Comedy, and, with the portraits of Brunetti Latini, Corso Donati, and others, are capital instances of portraiture at this epoch of art. The date of these portraits is about 1302, previous to the poet's exile. The Papal palace at Avignon, and the well-known Arena chapel, erected by

a rich citizen of Padua, were adorned by Giotto, and the painter is supposed to have assisted in the design of the latter chapel. Here three courses of frescoes, illustrative of the history of the Madonna and Christ, are from his brush, and comprise in all thirty-eight subjects. The vault is blue, studded with gold stars, the heads of Christ, the Virgin, and the Prophets, being interspersed. The arch of the choir has the Saviour in a glory of angels. In strict sequence, the lower portions of the walls contain allegorical medallions, in chiaro-oscuro, of the Virtues and Vices—the former feminine and ideal, the latter masculine and individual. Giotto here introduces new images from the Scriptures to extend the meaning, while he shows great power in historical illustration, and in the expression of high moral feeling. At Verona, Ferrara, Ravenna, and other cities, according to Vasari, Giotto left works, but at Sta. Croce, Florence, is found a gallery of this great artist's compositions showing not only his power as a composer of historical subjects, but his marvellous industry. Four chapels, among them those of the Peruzzi, Giugni, and Spinnelli families, were adorned by him. But, like most men of his class, he was followed by a host of feeble imitators, who, in proportion as they became Giotteque, grew lifeless and dwindled away. Few followers were more noteless. Sculpture, no less than painting, imbibed Giotto's spirit. The celebrated bronze doors of the Baptistery at Florence, executed by Pisano, were designed by him. Renaissance sculpture owes to him a lasting debt; and its spirit may be said to have been animated by him. Among the least known of Giotto's pupils was Taddeo Gaddi. His works show a purity and artlessness recalling his master's style. "When asked in his latter days to name the greatest painter in Italy, he exclaimed, 'Art has fallen very low since the death of Giotto.'" The development of painting was, however, barely taken up and carried on by him. At Sta. Croce his frescoes are numerous, though, with the exception of the Life of the Virgin in the Baroncelli chapel, they have all perished. Taddeo, like many contemporaries, was not only a painter, but an architect. He was engaged, with others, to rebuild the bridges which the inundation of the Arno at Florence in 1333 had destroyed. Ponte Vecchio, and the Ponte della Trinità, were designed by him.

(To be continued.)

#### METALLIC RIBBED STRUCTURES.

WE recently made some remarks on the relative advantages of girder, suspension, and arched bridges, and showed the superiority of the arched-ribbed system, under certain conditions, as proposed by Capt. Eads in a paper read at the American Society of Civil Engineers. The merits of that system consisted in a modification of the bowstring girder, in which ribs are in half lengths or segments, with counter or inverted ribs to secure rigidity of bracing, and with abutment and central joints, and a lever arrangement at the junction of the ends of ribs to avoid the strains induced by variation of temperature. As the means proposed to accomplish the latter is ingenious, it will be interesting to our readers to describe the method in detail. Let us take the ends or abutments of two adjacent arches as they abut against each other at the central pier. Here a skewback in one casting is formed, seated on a series of rollers which rest on the cap plates of the pier, the objects of the rollers being to avoid any horizontal strain on the pier itself arising from the extension of one set of chords and the compression of the others, when the load on one span is greater than the load on the adjacent span. Regarding the skewback, in its centre are two circular discs, fitted in circular rests, and their axes being coincident. The ends of the chords are fastened to these discs in the following manner. Taking one chord first, its end would be linked



to the discs by a short link which would be inserted between the two discs and pinned through them above their centre; the link from the other adjacent span chord would similarly be secured between the discs below their centre. The chords and links are also fastened together by like pins. It will be at once seen that the rotation of the discs in their seat would be caused by any variation of temperature; the discs, in fact, would become a vertical lever attachment between the ends of the chords. The upper angles of the skewback have half-round socket or hinge-joints upon which the arched ribs abut, and the joints not being close, any movement would have room for play. This kind of connection meets all the requirements of unequal strain due to load and temperature, and the skewback may be equally used for one-span or many-span bridges.

The supporting piers for structures of this kind may be considerably reduced in substance and cost. Taking a two-span bridge: if both the arches are loaded, the abutments will sustain as much thrust as an ordinary arch; the chords are only strained when one arch is loaded more than the other. As to the central pier, it sustains only vertical pressure. With four spans, the central pier need only be strong enough to resist the thrust due to unequal loading. Taking a single arch, if one end is supported by an abutment capable of sustaining only half the arch's thrust, and the other end has a skewback as we have described, and if the chord be secured to the end of the arch at one side, and to the link at the skewback abutment, so as to resist compression, one-half of the thrust of arch will be thrown on this abutment, the chord receiving the remaining half in tension. Hence, half the weight of the ordinary bowstring chord will be enough, while only half of the masonry required for such an arch is necessary.

One other point of economy may be mentioned. By the adaptation of ribs in half segments, braced together by the counter rib (see diagram p. 628), facility of erection is afforded. For a span of 500ft. a segment of steel, including the bracing, &c., would be less, it is calculated, than 50 tons, or a power of 25 tons at each end to lift it would be sufficient.

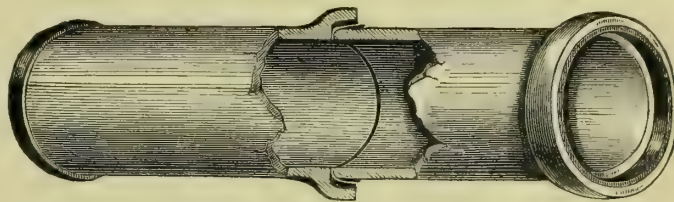
The suspension system, though in many respects superior to ordinary girder systems, has less economy than the upright arch. The cables between the towers and anchorages must be of large sections, owing to the great strain at those parts; the towers must be rigid enough to resist the tension of the cables; but in the arched-rib system the piers and approaches may be much lighter, and the spans more economic. Again, an ordinary bowstring arch requires massive abutments to resist the thrusts. In the case of the system discussed, the arch is composed of a pair of curved trussed rafters or segments jointed at the centre and ends of the span, so that, under any change of temperature, the abutments remain perfectly undisturbed; the crown only rising or falling as expansion or contraction takes place. The arrangement for apportioning some portion of the thrusts to the abutments, and some portions to the chords, by which, if one arch is loaded and the other unloaded, the chords are strained to the extent of half the thrust so created, the chords of the loaded arch sustaining half the thrust in tension and the chords of the unloaded arch half in compression—is highly economical. It is thus seen that any unbalanced thrust is borne by the chords, but when the arches are equally loaded or both unloaded, the chords receive no strain. The difficulties in the way of arched-ribbed structures have been the stiffening or bracing required to meet partial loads, and the unequal strains caused by temperature. We believe both these difficulties have been in the main partially or wholly removed by the system proposed by Captain Eads. No method of girder construction can span 500ft. with less than double or three times the dead weight of the metallic arch (which combines the advantages of the bowstring and

suspension principles) with equal strength and allowable strain.

Whatever may be the objections in detail which can be raised against the metallic arched system, as the want of lateral rigidity, the necessity of bracing the chords, which have to resist both tensile and compressive strains, there can be no doubt that by making the arched ribs rigid by the counter ribs by jointing them at the crown and supports, so as to give easy play under varying conditions of load and temperature, the difficulties attending the employment of metallic arched trusses are considerably reduced.

#### STANFORD'S PATENT JOINT FOR STONEWARE PIPES.

OF late years pipes made of stoneware, fire-clay, or other species of earthenware, have been very largely used in drainage and other works. Such pipes are usually made in from 2ft. to 3ft. lengths, the latter being about the limit that can be attained, on account of the liability of the clay to get out of shape whilst in the soft condition after leaving the machine. Each individual pipe being thus necessarily short, the number of joints in a given length become



proportionally great, there being, for instance, at least four times as many as in iron pipes of the same diameter. This being so, it is of great importance that the joint should be simple, easily made, cheap, and, above all, sound.

For the conveyance of sewage it is now a *sine qua non* that the whole pipe should be impervious and watertight, to prevent in the first place the escape of the sewage into the ground, and in the second the influx of subsoil water into the pipe. In former times it used to be thought desirable that sewers should be made so as to act as land drains, and consequently the joints of pipes were made with puddled clay, and sometimes this was done only on the lower half of the pipe, the socket being omitted altogether in the upper portion. This idea is now exploded, and a watertight joint has become an absolute necessity, and this want appears to have been completely met by the invention of Mr. Stanford. Any one who has had the least practical experience in the laying of sewer-pipes is aware that the difficulty of making a watertight joint, with the means hitherto available, increases in direct proportion to the necessity of making it. In running sand, for instance, where the ground has to be close timbered, and where a pipe must be laid immediately the trench is bottomed, the soundness of the joint is of the very highest importance, and yet these are just the conditions under which it is exceedingly difficult, nay, even impossible, to make a sound joint with cement or clay, or by any other means that involve careful manipulation.

The primary recommendation, therefore, of any system of jointing which shall commend itself to the judgment of practical men must be the facility with which the joint can be made in the trench. Anything that increases the labour or the time required in making one pipe good to another, is to be avoided. Trowel-work or tool-work of any description, external collars and internal bands or washers, are inadmissible. Such things are all very well in a mechanics' shop, above ground, but are utterly out of place in a wet sewer trench with the gravel rattling behind the polings. Mr. Stanford has attained considerable simplicity in this respect in his invention, because all that is required is to put the spigot of the pipe that is being laid fairly home into the socket of the one previously fixed. The joint so made will be absolutely watertight under any pressure that the pipes themselves will resist, and at the same time a slight settlement may take place without detracting from its soundness. This very desirable result has been arrived at in the following way: Pipes of earthenware are made by pressing the soft clay through dies, and

as they leave the machine their shape is perfect; that is they are true circles in cross section. Before they are ready to lay, however, they have to undergo the processes of drying and burning. During these processes the clay shrinks and bends, or warps to a greater or less extent, and no two finished pipes out of the same die are probably ever exactly alike. It is thus impossible to insure that the spigot of one pipe should ever fit perfectly into the socket of another. It has, therefore, been the practice to make them so that a space or ring should be left in the socket round the spigot of the entering pipe, and this space has been filled with cement or other material to make the joint when the pipes are being put together in the ground. Socketed iron pipes are jointed either in this way—lead replacing the cement, or their ends are respectively bored out, and turned so that they fit exactly, the one into the other. The "Stanford" joint is made on the latter principle, the true mechanical fitting of one pipe into another being accomplished, not by turning and boring, as with iron, but by running into the socket and round the spigot (by means of truly-turned iron moulds), rings of a material which immediately sets hard and adheres firmly to the pipe, and which rings are exact counterparts one of the other. To allow of this being done, the sockets are made somewhat wider

but not so deep as is usual. A longitudinal section of the pipe shows a curved surface on these rings; they are, in fact, spherical in form, and are thus free to move upon one another within certain limits, like a ball-and-socket joint. As this casting on of the rings is done after the pipes are burned, the accuracy of the fit is in no way influenced by the inaccuracy of shape in the pipes themselves. All, therefore, that is required when the pipes are laid, is to put the spigot of one into the socket of another. No joint material is required, no tools, and the minimum amount of labour. Time is thus saved where the saving is often of the utmost importance. To engineers who are designing sewerage works in wet ground this joint will be valuable, because by its use they can insure their pipe sewers being watertight, without the adoption of the costly and unreliable expedients now in use. Sewer-trenches need not be absolutely dried by pumping, as is now necessary, in order to make cement joints, and thus the expense of works will be diminished. The joint may be applied with advantage to junction-blocks to be built in brick sewers, and to the plug inserted in them before the branch is connected. Stoneware pipes may be laid under pressure for the conveyance of water, or for carrying sewage across shallow valleys on irrigation farms, and in many other ways the use of stoneware pipes may be greatly extended, now that a means has been devised of making the joint as sound and watertight as any other part of the pipe. Messrs. Doulton and Co., of Lambeth, are the manufacturers of the patent.

#### THE CONSTRUCTION OF WAREHOUSES AND WORKSHOPS.\*

(Concluded from page 679.)

WE are unacquainted with the particulars, or even the nature of the experience that justified Captain Shaw in writing "When it is necessary to use iron columns, they will be found more capable of resisting the effects of heat if made solid and not hollow, as is most commonly the case" (page 42 of *Fire Surveys*). A solid column of cast iron may or may not be better adapted than a hollow one to resist the effects of great heat; at any rate the advantage cannot be considerable when the metal in the hollow column is, as usual, three-quarters of an inch or upwards in thickness. Cast iron is not a good conductor of heat.

The metal in solid columns, of even comparatively small diameters, say of 4in., is liable to be spongy or porous in some portion of their lengths,

\* By W. C. HOMERESHAM, C.E., in *Iron*.



and such a defect, except when very extensive or on the surface, cannot be detected by the most careful examination. Castings of a thickness of from, say,  $\frac{3}{4}$  in. to 1 $\frac{1}{2}$  in. are not nearly so liable to such a defect; moreover, columns that are hollow can be thoroughly and inexpensively tested by the hammer, and by hydraulic pressure. The economical view of the question must not be ignored for an advantage so very slight, if any, on the point of safety, from the effects of possible conflagration. The quantity of iron in solid columns of strengths and heights necessary for carrying the floors of ordinary warehouses and workshops is fully 50 per cent. greater than that which would suffice to cast hollow columns of similar strengths and heights. Thus a solid column of cast iron, 4 in. in diameter, weighing 40 lb. per lineal foot, has only the same amount of strength as a hollow column 5 in. in external diameter and 9-16th in. in thickness, weighing 25 lb. per lineal foot, when the height is 9 ft.; and a solid column 12 ft. in height, 7 in. in diameter, weighing 122 4 lb. per lineal foot, is only of equal strength with a hollow column of similar height, having an external diameter of 9 in., a thickness of 1 in., and weighing 80 lb. per lineal foot.

The late Eaton Hodgkinson ascertained that within certain limits the strength of columns is as the 3-6th power of the diameter in inches, and universally as the 1-7th power of the length or height of the column. The formulae for calculating the strength of the columns of cast iron, both solid and hollow, and of any proportion of length to diameter, is given in the second part of Tredgold's "Practical Essay on the Strength of Cast Iron and other Metals," edited by Eaton Hodgkinson, F.R.S.

The basements of warehouses and workshops, like each of the other compartments, should be isolated, and the entrance thereto for goods should be by means of trap-doors direct from the street or yard. Where practicable, the entrance to the basement should be in duplicate and placed at opposite ends or sides of the building, in order to encourage a through draft of air. For the London general trade the more usual and convenient dimensions in the clear of the opening of the trap doors for the basements of warehouses are 9 ft. 9 in. by 4 ft. The hinges should be so arranged as to permit of the flaps lying flat on the ground when open. When the arrangement is such that the flaps stand perpendicularly or nearly so when open, it only too frequently occurs that the flaps get damaged by the goods hanging in the crane chains coming accidentally in contact with them. The flaps are frequently made in the form of gratings, and built of wrought-iron bars. The framing for the trap doors where gratings are to be used should be provided all round the opening with a recess to be filled with puddled clay, and to receive the deep sides of a sheet-iron cover to be provided and kept handy to be used in case it should become desirable either to exclude the atmosphere from the basement or to prevent water pouring into it, as would be the case in all probability, without such precaution was taken, should a conflagration occur in any of the contiguous premises.

The means of draining the basement as well as the upper portions of a building should not be neglected in the original design. Should the floor of the basement be at a level too low to admit of it being drained into a common sewer or drain, a sumpt or tank should be sunk in a position convenient for the purpose of being pumped dry. The basement flooring and the surface drains thereof being laid at appropriate levels in respect to the sumpt, no difficulty will arise on that most essential point—the frequently and thoroughly cleansing the basement floor.

Where the drainage is to be carried into the common sewer or drain, great care should be taken to protect the buildings from the incursions not only of rats, but of foul air, by the insertion in each connecting drain of efficient traps and syphons in duplicate. The course of the drains and the site of every trap and syphon should be marked on the flooring of the basement. A convenient and inexpensive method of so doing is to cut a niche in the flooring over the courses of the drains, and insert a square of Yorkshire paving over each syphon or trap of sufficient size to permit of the ground thereunder being excavated and the syphon or trap examined and cleaned without the necessity of removing any other portion of the flooring. On the top surface of the Yorkshire stone, the depth therefrom to the top of the syphon or trap should be marked, in bold deeply-

cut figures, for the guidance of the workmen who have to keep the premises in repair.

Warehouses for wheat, otherwise granaries, have been hitherto built in stories of low pitch or height, compared with those of warehouses for general merchandise. Corn of all kind requires to be kept, not only perfectly dry, but in such a position that any moisture contained therein may have every facility for evaporating. If wheat be stowed in bulk to any considerable depth, it will sooner or later—according to the amount of moisture contained therein, depth to which it is stowed, temperature of the atmosphere, &c.—heat, i.e., a kind of spontaneous combustion will set in and damage the entire bulk. The whole of a ship's cargo of wheat has often been rendered valueless for human consumption by overheating when it has been stowed in the hold in a too new or a damp condition, and proper precautions have not been taken at sea. To prevent overheating in the warehouse, wheat is stowed in layers of a thickness convenient for being occasionally turned over, and having the interior of the mass exposed to the action of the hemisphere. New corn requires far more attention in this way than old corn that is warehoused in good condition. Old dry wheat may be stowed in layers having a thickness of as much as 4 ft., whereas layers of new wheat or of corn that contains a sensible degree of moisture should not exceed one-half that dimension in depth. The more shallow the layer of corn is, the more thoroughly and expeditiously can the operation of turning be performed. In most granaries in England at the present time, and until recently, in all, the only means for preventing the heating of corn when warehoused has been to turn it as occasion may require by manual labour; a somewhat tedious and expensive operation. Several granaries have lately been adapted to the American plan of storing wheat, and supplied with appropriate machinery driven by steam for turning the corn and forcing dry air, in the act of expanding from a high pressure, through the layers of wheat. Expanding air has a great affinity for both heat and moisture, and carries off any of either or both with which it comes in contact in its passage through the layers. With these appliances in active operation, wheat may be kept, at a moderate cost for labour (mechanical), for any length of time without it turning mouldy or heating, and old wheat may be stowed with safety in layers having as great a depth as 6 ft. or 7 ft.

For warehousing rice or oil-seed a system has recently been adopted of having sets of receptacles or hoppers in brick or sheet iron, in which to stow them in bulk, in place of stowing them on the open floors of warehouses. By this contrivance freedom from the ravages of vermin is secured, and the expense of labour in warehousing and re-delivering is reduced to the minimum. A set of nine hoppers, each 10 ft. square, by 40 ft. in height, in internal dimensions, cost about £800 when constructed in brickwork, and will stow 900 tons of rice, or nearly 650 tons of oil-seed. In connection with these hoppers machinery can be arranged to deliver rice or oil-seed into them without the aid of manual labour, and when the hoppers are supported on arches the contents of the hoppers can be drawn off into sacks with facility.

#### WORKING-CLASS DWELLINGS IN LEEDS.

ON Monday afternoon a conference was held in the Philosophical Hall, Leeds, for the purpose of considering proposals for the improvement of working-class dwellings in Leeds. Mr. W. B. Denison presided.

The Rev. F. J. WOOD read a paper, in the course of which he said: There are hundreds, I fear I must say thousands, of houses in Leeds which are absolutely unfit for human habitation. In many of these each room is let off as a separate tenement, in which a whole family have to perform all the offices of life both by day and by night. Others are inhabited by only a single household, but in these instances many of the houses are old, inconvenient, and dilapidated, mostly containing only two rooms, both far too narrow and confined for the accommodation of father, mother, and several children of various ages and sexes, all of whom have to sleep together in the one bedroom. And remember that the evils attaching to such miserable and unhealthy dwellings are, in the case of a town like Leeds, aggravated by the fact of their situation in narrow courts and passages so hemmed in by surrounding

buildings as to prevent the access of any free current of air, and sometimes even to shut out the very light of heaven itself. I am afraid that we cannot look for much assistance from the present owners of cottage property in Leeds, and the only hope that I can see of any permanent improvement in the dwellings of the poor in Leeds, and of the mitigation and gradual removal of some of the greatest blots in our social system, is the establishment of a society based on the same principles as those which already exist in many other towns, and have been productive of untold good. As you are aware, the subject has occupied the serious attention of the committee of the Leeds Social Improvement Society, and some of the gentlemen connected with it have already formed themselves into a company, which is to bear the title of the "Improved Dwellings Company," and they have called this meeting for the purpose of ventilating the whole subject, and for mutual conference and discussion upon the best means of carrying out an object which must at once commend itself to all those who take any interest in the welfare of their poorer brethren. The primary intention of those who have initiated this movement is not so much to build good houses in the suburbs for the better class of artisans—this work may be left to private enterprise and the building societies to accomplish—but rather to buy blocks of houses in the very worst neighbourhoods, and by putting them into proper repair and introducing various sanitary improvements, make them fit for human habitation.

Miss OCTAVIA HILL next gave an account of similar work in London. She said that what had been done in London was small, but as far as it had gone it had been very successful indeed. She had lately visited Glasgow, and had seen the extent of the improvements which had been executed there during the last five years. The Corporation had not been allowed to remove houses until they had satisfied the sheriff that they had ample house accommodation for the people, and in that time they had provided for 25,000 people. It was now just thirty years since the first association was formed in London for improving the dwellings of the poor, and during that time, including all that had been done by the association and by such well-known individuals as the Baroness Burdett Coutts, the entire number provided for had only been 26,000, or little more than half the annual increase of London. But in London they had no compulsory powers, and she hoped that in Leeds they would get the Corporation to do as Glasgow had done, because it was exceedingly difficult for any association to do such work. There was a portion of the work, however, which could not be done by any Corporation, and that was training the people to be fit for better dwellings. That, she thought, would be best done in old buildings, and not in new ones. It was almost impossible, from her experience of the lowest classes in London, to put them in good houses at once. They were so exceedingly destructive, so dirty, so unused to order and cleanliness, that they could not be put into good houses at once, and she did not think they would go. They felt shy about going into a good place, and unfit for it. What should rather be done at first was to improve gradually the houses in which these people lived; to put the drains, water supply, and roofs in good order, and to do nothing else. In London, it was found that after buying houses and renting them, they had a considerable amount of money over, and instead of increasing their capital they used this money to improve the houses gradually; but they did that in proportion to the care which was exercised by the tenants. At the beginning the tenants were very destructive. They stopped up the drains, burned the panels of the doors, and broke everything; but gradually the houses had been improved, and the people turned less destructive. For a time that distinctly reformatory work would have to be done, and it must be done by voluntary effort, and with the deepest respect for the independence of the people.

In reply to Mr. T. W. Harding, Miss Hill said that the earliest of all the buildings with which she was connected had a rental of £123, and the balance which they had for repairs and alterations was £35 a year—a very large amount considering the amount of rental. Among their other buildings they had a freehold building with a rental of £419, and the balance on this entirely new freehold property was £120 a year for repairs and improvements. Miss Hill also mentioned a third property, which had a rental of £577, and



a ground rental of £240, but after paying all expenses there was a balance for repairs and improvements of £130.

Mr. T. W. HARDING, the hon. secretary, referred to the work done by similar associations in London, and stated what were the objects which the Leeds Society had in view. What they proposed to do was very similar work to that which had been explained by Miss Hill. The means they had chosen was that of a limited company, and they had purchased a block of buildings in Shannon-street. They felt certain that they would have a fair profit upon it, and might be induced to go further. They intended, in the first place, to buy existing tenements, and to expend whatever they had above 5 per cent. on the improvement of the buildings.

The following resolution was adopted:—That this meeting is of opinion that there is great need for improvement in the dwellings of the poorer classes in Leeds, and that the attempt that is being made by the Leeds Improved Dwellings Company deserves the cordial support of the public.

#### CIVIL AND MECHANICAL ENGINEERS' SOCIETY.

THE first meeting of this Society for session 1874-75, was held on Friday evening last, at 7, Westminster Chambers, Victoria-street, when the president, Mr. G. W. Willcocks, Assoc. Inst. C.E., delivered an address. After a few introductory remarks, he congratulated the members on the success which the Society has attained, and stated that during the past year the Council had endeavoured to increase the usefulness of the society by encouraging courses of lectures by its members on subjects of interest to engineers and engineering students generally. The large attendance at these lectures, and the eagerness shown by many students, had been such as to induce the Council to continue these lectures during the present session, and it was hoped that the interest will be sustained, and that courses of lectures of this kind would for the future be recognised as forming part of the regular work of the Society. The best definition of "civil engineering" was probably that to be found in the charter of the Institution of Civil Engineers, where it is defined as "the species of knowledge which constitutes the profession of a civil engineer, whereby the great sources of power in nature are converted, adapted, and applied for the use and convenience of man." Accepting this definition, civil engineering included within its ranks the great constructive geniuses of all times, from Archimedes to Smeaton. As the future, not only of the profession, but of scientific knowledge generally, rested mainly on the training and tastes of the rising race of engineers, the subject of professional education was of the utmost importance. While those who were ambitious of leadership in the profession could not afford to neglect the old lines upon which greatness has been hitherto built up, it would be idle to deny that the study of mathematics was, above all, the one thing necessary, and, in truth, no pupil should be articulated until he had to a great extent grasped the leading principles of pure and mixed mathematics. Good service had been rendered to the profession by the Universities of Dublin and Glasgow; for not only could the members of those learned foundations obtain a good university education—in the old-world sense of the term—but degrees in Engineering were also conferred, just as they were conferred in Divinity, Law, and Medicine, and it was to be hoped that the time was not far distant when our English universities would follow the example thus set them. It was true that at the University of London a degree might be taken in Science, but this, like all the other degrees of that university, required a thoroughness and depth of abstract knowledge which could only with great difficulty be attained by the ordinary student without the neglect of subjects of urgent practical importance. The opportunities now offered to students by the Institution of Civil Engineers were very great, and the run of a well-stored library was in itself an incalculable benefit to any man of energy and intellect. A knowledge of physics, chemistry, geology, and mineralogy—all very essential subjects for the engineer, could never be acquired in an office, and were only attainable by good hard reading and constant attendance at courses of lectures such as those at King's College and kindred institutions. Having dwelt on the extreme importance of a knowledge of geology on the part of the engineer, Mr.

Willcocks briefly glanced at the history of modern improvements in the means of locomotion, and passed in review the subjects of railway signalling, the widening of the London and North-Western and the Great Western Railways, now almost universal, the substitution of steel for iron rails, the enormous development of railway passenger and goods traffic during the past ten years, and new schemes for promoting internal communication. Upon the latter subject he remarked that no less than seven new railway projects for the metropolis received the sanction of Parliament during the past session, the first in importance being the Metropolitan Inner Circle Completion line, by the construction of which several new thoroughfares will be provided, the total cost being estimated at £2,300,000. The Acton and Hammersmith Railway will connect the North and South-Western Junction Railway at Acton with the Hammersmith Extension Railway at Hammersmith. The cost of this line, which is a little over two miles in length, is estimated at £480,000. The East London Railway, which was commenced in 1866, and which will run from the New Cross stations of the London, Brighton, and South Coast and South-Eastern Railways to New Broad-street, is still in progress. The southern part of the line, from the Thames Tunnel to New Cross, was completed in 1869, and the works on the north side of the river are being vigorously pushed forward. The engineers and contractors have had to contend with many difficulties, on account of the great amount of water which is always flowing into the works. The cost of pumping has been enormous, but the construction of the tunnel, under the London Docks, has been the most anxious part of the undertaking. Sir John Hawkshaw and Mr. George Robert Stephenson are the engineers. The Great Eastern Extension Railway to Broad-street, which has been a long time in progress, is rapidly drawing to completion, under the superintendence of Mr. Edward Wilson, the chief engineer. The bridge which carries Primrose-street over the railway is 175ft. span, the width of the roadway being 33ft., and the depth of the girders, which are of the lattice variety, 22ft. The station is now being covered by an iron roof in four spans. Passing on to the subject of light railways, Mr. Willcocks said that upon the amount of traffic, and the maximum speed intended to be run, the engineer would have to base all his calculations as to the character of the works. The great hindrance to the construction of light railways was the enormous sum, in proportion to the costs of the works, needed for Parliamentary expenses. Neighbouring landowners could solve the difficulty by taking the matter into their own hands, and combining for the construction and maintenance of such lines. French railway statistics, and railway couplings and brakes, having been discussed, Mr. Willcocks said the Channel Tunnel now seemed in a fair way of being commenced, under the direction of Sir John Hawkshaw and Mr. Brunlees, the consulting engineers. The tunnel, which it was proposed to construct for a double line of rails, would be straight, and would extend from St. Margaret's Bay, South Foreland, to a point midway between Calais and Sangatte. The stratum penetrated would be the grey chalk, which, being impervious, would be free from water. The estimated cost was £10,000,000. Having described the new bridge over the Tay, above Dundee, a proposed new bridge over the Severn at Lydney, a proposed tunnel under the Severn at Portskewit, and the St. Gothard Tunnel, Mr. Willcocks touched on engineering prospects in South America, Japan, and India, expressing the opinion, with regard to Indian railways, that the break of gauge which has been determined upon by the Government is a grievous mistake, for after the experience which had been gained in this country it could hardly be doubted that a universal gauge, whatever it might be, should always be adopted. Railway management having been discussed, sanitary engineering was referred to, Mr. Willcocks remarking, with reference to the sewage difficulty, that utilisation, in some shape or another, and not mere disposal, was demanded by the country. Irrigation had done much, but it could never be of universal application. Lighthouses and breakwaters having been treated of, the progress of general engineering works was dwelt upon, followed by references to the Bessemer Channel steamers, the "Coal Mines Regulation Act, 1872," improved Javy lamps, the sub-Wealden exploration, the newly-discovered coalfields in America and New Zealand, and the value of peat as a fuel when properly condensed. Having described

several varieties of rock-drill, and detailed some experiments with dynamite and lithotractor, Mr. Willcocks concluded a long address by describing Tweddell's hydraulic rivetter for girders, boilers, &c., and Shaw's gunpowder pile-driving engine. The latter consists of a monkey, having a piston extending downwards, which, falling into a cannon or mortar resting on the head of the pile, explodes, by the sudden compression of the air, a cartridge of gunpowder with which the cannon is loaded, causing a strong downward pressure; and the monkey by the same explosion is thrown up into the required position, where it is held by a brake until released for the next blow. In this way thirty or forty blows may be delivered in a minute without any fear of the pile being split, as the force is simply compressive. Thus the extra expense of ringing and shoeing may be entirely dispensed with, and it is estimated that from five to ten piles may be driven by this system while one is being driven by the ordinary steam pile-driver.

#### THE LEICESTERSHIRE ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETY.

ON Monday week, the bi-monthly meeting of this Society was held. A letter was read from Mr. North, one of the honorary secretaries, on the subject of the papers to be printed in the volume of the Associated Architectural Societies, when it was resolved that the paper on the Rolls of the Mayors of Leicester, and that on the Pates of Sysonby, read at the recent annual meeting of the Society, be published in the forthcoming volume. A series of thirty-four drawings of the ground-plan and stories of Wigston's Hospital (including the wing at the rear), with details of the timber-work and stonework, and all the mouldings, and so forth, was handed round among the members of the committee for inspection. The Chairman remarked that the drawings were so complete that by their aid any competent architect could reconstruct Wigston's Hospital on the present site, were it taken down, without the omission of any feature. Messrs. W. H. and Alfred Ellis exhibited antiquarian remains found at their lime-pits between Sibley and Barrow, near the site of former discoveries, including three ampullæ, with handles, an ampullæ without handle and with small bottom, three lamps of earthenware, fragments of green glass bottle, leaden cover of glass bottle, iron nails, and fragments of burnt bones. Mr. Alfred Paget, jun., exhibited a number of encaustic tiles found in the flooring of All Saints' Church, Leicester. Altogether there were 32 entire tiles, with fragments, having upon them armorial and other devices, such as royal heads (crowned), letters, monkeys, flowers, &c. Mr. Paget also exhibited portions of stained-glass, taken from a window in the church. Major Bellairs read a paper by Mr. T. North, on the parish registers of Evington.

#### CHIPS.

A new Roman Catholic chapel is about to be erected at Newton Stewart, at a cost of £3,000.

Lambourne Church, Berks, is apparently in an unsafe condition. A great fall of plaster on the roof startled all within its walls on Sunday last, and the parson and the lord of the manor headed a general stampede of the congregation.

Some idea of the extent of railways in the Metropolitan district may be judged from the fact that there are no fewer than 245 railway stations within an area of 12 by 18 miles.

Some remarkable wall-paintings have lately been discovered in the Church of St. Mary, Earl Stonham, Suffolk. Mr. H. Watling states that the entire walls were evidently formerly ornamented with paintings from Scripture history, but that most of the paintings are now defaced. He has made out a Nativity, with the Wise Men and the Shepherds advancing to worship, on the east wall of the north transept; a Martyrdom of St. Catherine in the south transept; and a "rich and perfect representation of the Last Judgment, exquisitely outlined, and evidently painted by a more masterly hand," above the chancel arch.

The Goldsmiths' Company have presented fifty pounds to the Council of the Royal Architectural Museum, Tufton street, Westminster, in aid of their Drawing and Modelling Classes for Art Workmen. An Exhibition of the Drawings and models sent in competition for the prizes for designs for Plate offered by the Goldsmiths' Company will shortly be held in the Museum, admission free.

Staincliffe Church, Yorks., was reopened on Thursday week, after restoration.



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## ILLUSTRATIONS.

ST. MARY'S CHURCH, WARMINGTON—HOLMEWOOD HOUSE, HUNTS—PARISH CHURCH, NESTON.

## OUR LITHOGRAPHIC ILLUSTRATIONS

## ST. MARY'S CHURCH, WARMINGTON, NORTHAMPTONSHIRE.

THIS church, of which three page illustrations are given, is dedicated to the Virgin Mary, and consists of nave, aisles, chancel, tower, and north and south porches. It was probably begun about the year 1225, and finished some 25 or 30 years later, the magnificent oak groined roof of the nave appearing to be of the latter date. The bosses in this roof are particularly fine examples of wood-carving for so early a period, and it may be added that the carving throughout this church is remarkably beautiful. The churchyard is raised considerably above the road level, and formerly the ground had been allowed to accumulate to such an extent that on its removal the bases and plinths were much damaged. The whole of the interior has been thickly covered with many coats of whitewash—even the beautiful nave roof did not escape; but the latter has been cleaned, and the colour of the oak boards is very fine in its effect. The principal entrance is by the south porch, which is the most important, and it is worthy of notice that on plan it is not rectangular, but widens out 6 in. towards the south, this being probably intended to add to its apparent length. The same peculiarity exists in the north porch. The piers to south nave arcade are circular, while those on the north side are octagonal. The staircase to rood-loft on north side of chancel arch still remains, but is at present blocked up. The rood-screen itself is, however, destroyed. Some of its materials have evidently been re-used in the pulpit and seating, and on these remnants traces of colour are still discernible. An interesting example of the Iconoclasm of the sixteenth or seventeenth century was discovered on opening the niche on west wall of tower, where three mutilated statues were found, which had been plastered up therein. There are five bells still hanging in the steeple, and the beauty of the steeple as well as that of the belfry, west doorway, &c., is beyond all praise. The stone of which the church is built is that known as Barnack rag. The chancel is the least interesting portion of the church, having been greatly remodelled in the fifteenth century. Its original roof was then removed and a flat-pitched one substituted. This was so awkwardly managed that it cuts across chancel arch in a very unsightly manner; externally the arch is closed up with boarding covered with lead. The windows in east and south walls are also insertions of this later date. There are no traces of sedilia or piscina in chancel, though two small piscines are to be found in the south aisle, simple, but of early date.

GEO. D. OLIVER.

## THE PARISH CHURCH OF NESTON.

This church, dedicated to St. Mary and St. Helen having become very much dilapidated by lapse of time, it was resolved to undertake an effectual restoration and extension, in accordance with designs prepared by James Francis Doyle, architect, Liverpool. The church, of which we give exterior and interior perspectives, is a very ancient edifice, and was in existence prior to the Norman Conquest; it consists of nave, north and south aisles, chancel and vestry, with galleries on the west and north sides. The nave arcade has been erected in the Norman style, but much mutilated; there are four Norman arches remaining, as indicated on plan. About 150 years since (it is supposed) several of the piers and arches were removed, and arches of an elliptic form in-

serted over the space of two original Norman arches, and a "late" arcade erected at side of chancel. The caps and bases of the Norman work have been much cut away, and almost destroyed, but there are still indications of the beauty of the original work. The tower is built of great strength, the wall at the base being about five feet thick; it is supposed the upper portion of the tower was rebuilt in 1697, that date being found cut on a stone let in the face of the tower, together with the names of the churchwardens. The proposed work embraces the rebuilding the main body of the church (except the tower and the south wall), the insertion of a clerestory in the nave, and the extension to the east of a chancel, vestry, and organ-chamber. At the west end of the nave arcade, the three Norman arches (one in tower, and one on either side of arcades) are retained and restored, the remainder of the church being carried out in the Early English spirit, with a slight infusion of Early Decorated work to appear in harmony with the tower. The external work will be built with local red stone to match existing work; the interior arches, window reveals, quoins, and face of chancel walls will be of white Stourton stone slightly intermixed with red stone; the whole of the roof timbers and other finishings of selected figured pitch pine, and the outer door of oak. The church will be warmed with a combination of hot water and hot air. It is in contemplation (if funds admit) to erect a new and suitable boundary-wall and railing round the church. The execution of the work has been intrusted to Messrs. William Tomkinson and Son, contractors, of Liverpool, under the immediate supervision of the architect, James Francis Doyle.

## HOLMEWOOD HOUSE.

This mansion has been erected on the estate of W. Wells, Esq., at Holme, Hunts. The external walls are built with red bricks. The window-jambs, cornices, &c., are partly in red moulded brick and terra-cotta. The mullions and transoms are Ketton stone, and the roofs are covered with brindle coloured tiles. The circular bay on the left-hand corner of our illustration has been omitted in carrying out the work. The architect is Mr. W. Young, of Exeter Hall, Strand.

## PROPOSED WIDENING OF LONDON-BRIDGE.

MR. EDWARD THOMPSON, of Leadenhall-street, has submitted to the Court of Common Council a plan for widening London-bridge and its approaches, with a view of affording increased accommodation to the enormous traffic which passes over the bridge. He proposes:—To extend the piers and abutments on each side 12 ft. To throw wrought-iron girders from pier to pier, to carry the footways, corresponding in outline with the present arches surmounted with a trussed cornice, making a total available space on each side of the bridge, 15 ft. wide for foot-passengers. The whole of the present bridge, including footpaths, would be available for carriage traffic, being 18 ft. wider than at present. Mr. Thompson also proposes to cover the footways with an iron and glass arcade; similar to the bridges at Liverpool connecting the shore with the landing-stages, which have been found to answer well.

With regard to the approaches to the bridge, he proposes:—To throw back the buildings from the corner of Eastcheap in a line with Adelaide-place, the only side necessary at present to improve the approaches to the bridge. The widening of the west side, in line with Fishmongers' Hall, although desirable, might be deferred for the present. Mr. Thompson would also construct a covered bridge on the Surrey side, from the rail-

way arch by Messrs. Findlater's stores, to opposite the Bridge House Hotel, so that foot-passengers wishing to cross the street could do so free from danger to life and limb.

An elevation of London-bridge as it is at present, and as it would appear widened according to Mr. Thompson's plan, does not at all recommend the proposal. We should be sorry to exchange the present bold and simple aspect of Rennie's bridge for the iron and glass structure offered us by Mr. Thompson, in which the cheap railway-station style of architecture unmistakably predominates. We think, too, with Mr. Haywood, the City Engineer, that the widening of London-bridge could be but a temporary relief—if indeed it proved any relief at all—to the traffic which passes over it, and that the true course to be adopted is the erection of another bridge lower down the river, as repeatedly recommended by Mr. Haywood to the City Commission of Sewers.\*

## PATENT ADJUSTABLE DOUBLE-ACTING DOOR-SPRING.

THE action of this spring depends upon a coiled spring contained within a cylindrical case, its outer end being attached to the case, and its inner end to the spindle. The upper ends of the case and spindle are prolonged, and are made hexagonal in shape, and to the hexagonal ends thus formed are attached two curved levers, the curves being in opposite directions, the convex sides together, and between them works the lever attached to the door axis, a friction roller being interposed between the bent levers, which are kept together by the spring. An adjustable screw is placed between the outer ends of the bent levers, which regulate the position of the curved levers and the roller or lever between them, consequently the door itself can be adjusted to its position when closed. It is also arranged that the spring exercises its greatest power when the door is closed, and is, therefore, kept more effectually shut. As the door is pushed open one way or the other, the door lever acts upon either one or the other of the curved levers or bars, which thus tends to return the door to its original position. The axis of the door and spring levers are not concentric. We are disposed to think this patent of Mr. Ben. Turner will prove a useful substitute for other springs of the kind more or less liable to get out of order.

## CHIPS.

One of the large old beech-trees in Queen Mary's Avenue at Leslie House, lately blown down, was supposed to be one of the largest and finest beeches in Fife. It is calculated to consist of fifty tons of wood, and the portion of it not destroyed by the fall is computed to contain 300 cubic feet of sound timber.

The memorial-stone of a new Baptist chapel at Christchurch was laid on Tuesday week. Mr. J. W. Rowland, of Southampton, is the builder.

An important archaeological discovery has lately been made at Herculaneum, viz., a silver bust of life size, and in an excellent state of preservation. It is impossible to say, at present, whether it is cast or worked with the chisel, or whom it may represent.

The tender of Mr. Eddles, of St. Mary Church, in the sum of £674. 10s., has been accepted for the restoration of the parish church of Kingskerswell, S. Devon. The architect is Mr. J. W. Rowell, Newton Abbot.

The free reading-room at Guildhall has now three large paintings on its walls. The subjects are George III., Queen Charlotte, and Minerva; the first two by A. Ramsay and the latter by R. Westall, R.A.

The death has occurred, at Munich, at the age of seventy-five, of the well-known Bavarian genre and animal painter, Karl Hess. His pictures were especially remarkable for the fidelity with which he reproduced the characteristic features of Alpine and forest scenery, and the special individualities of animal life.

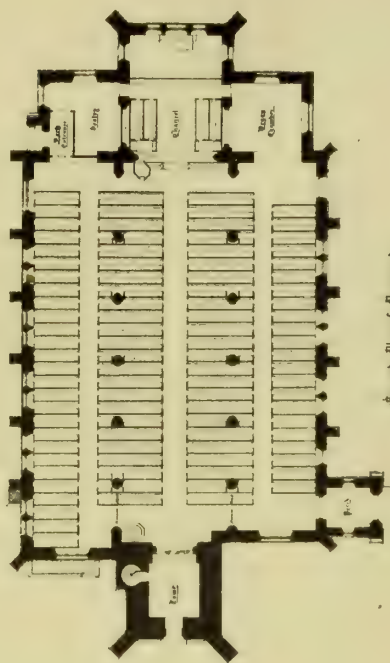
A house in course of demolition in Old Market-street, Bristol, fell on Monday, killing one man and injuring three others.

\* See BUILDING NEWS, Feb. 9, 1872, p. 119.

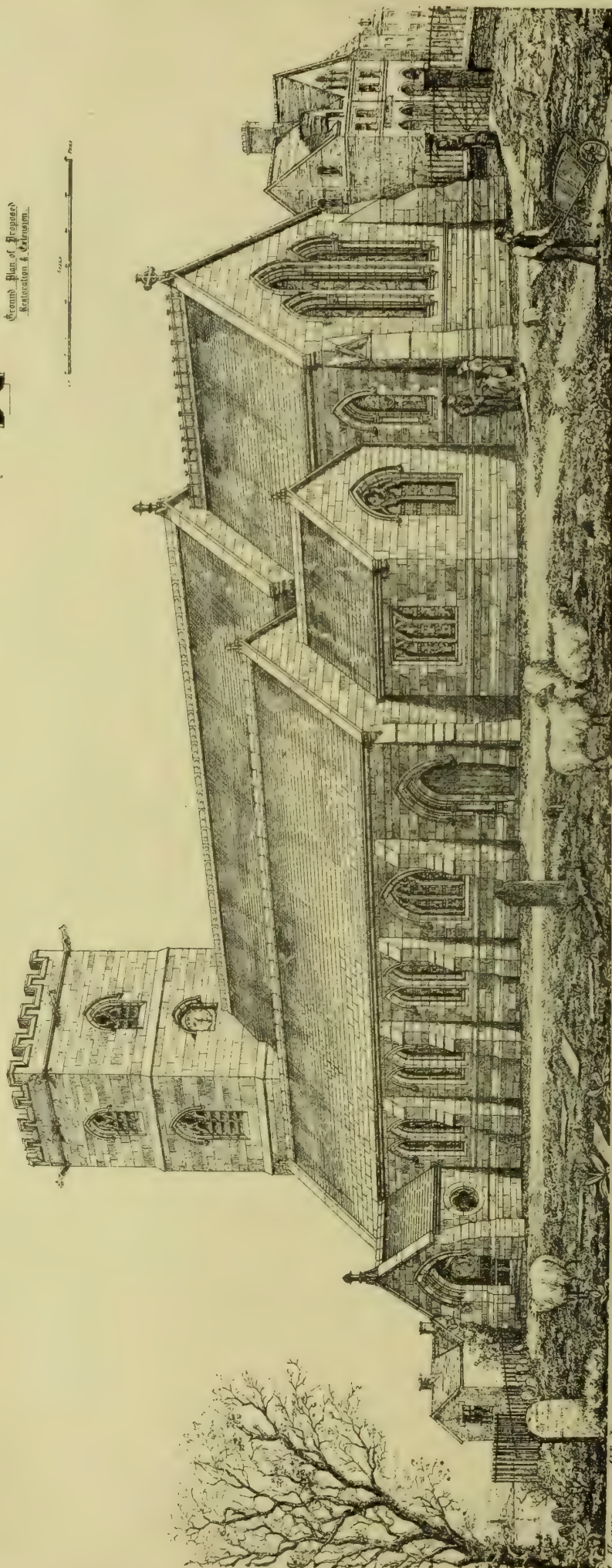








Ground Plan of Proposed  
Restoration & Extension.



J. BARRINGTON & SONS, LIVERPOOL.

JAMES FRANCIS DOYLE, ARCHT.

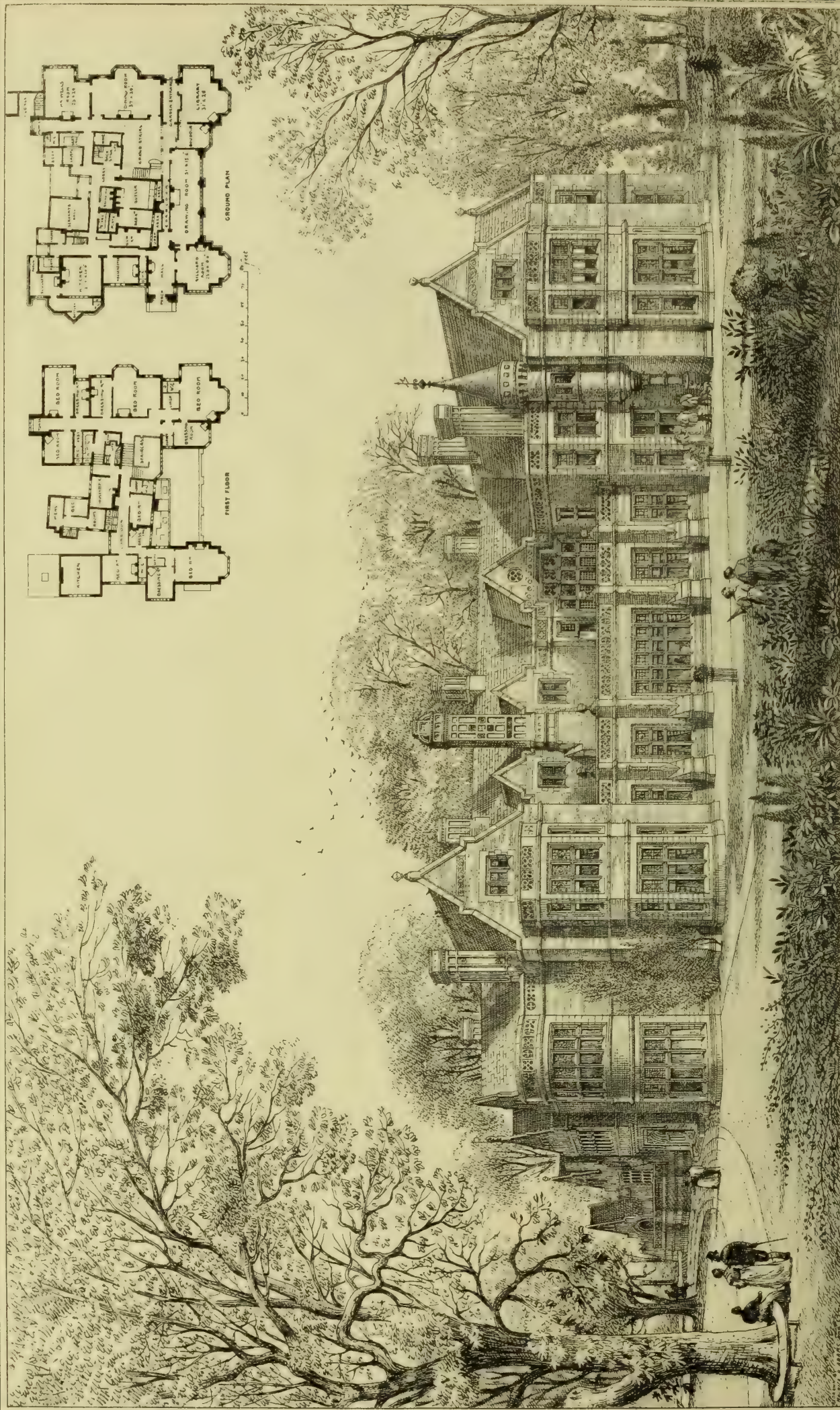
Parish Church, Neston, Cheshire

Photo. lithographed & Printed by James Alcockman, 51, Gray's Inn Road, W.C.









HOLMEWOOD HOUSE, HUNTINGDONSHIRE, FOR W. WELLS, ESQ. WILLIAM YOUNG, ARCHITECT.

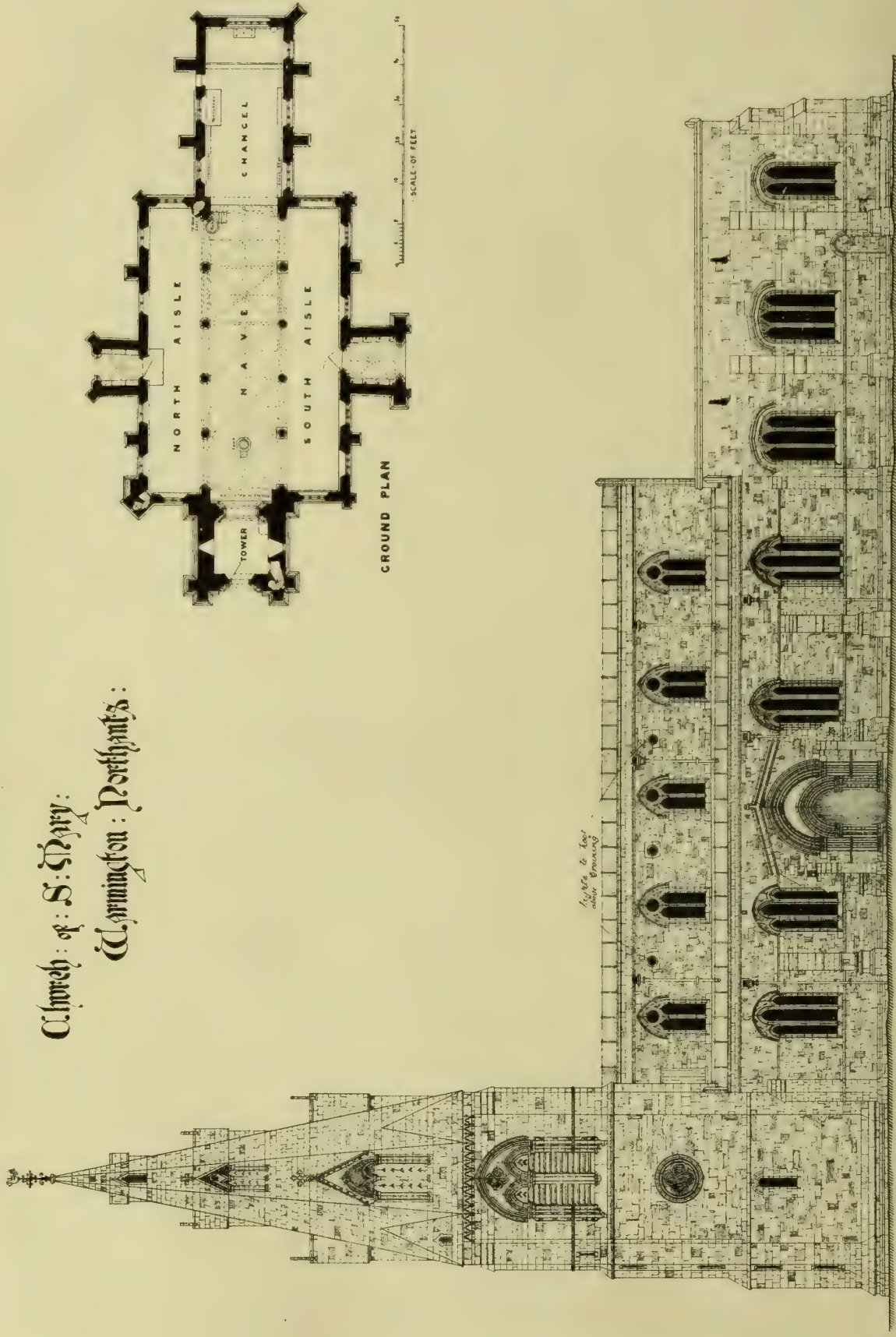
Printed by J. & J. S. Young, 15, Abchurch Lane, London, E.C. 4.







Church: of: S: Mary:  
 W: arminster: Northants:



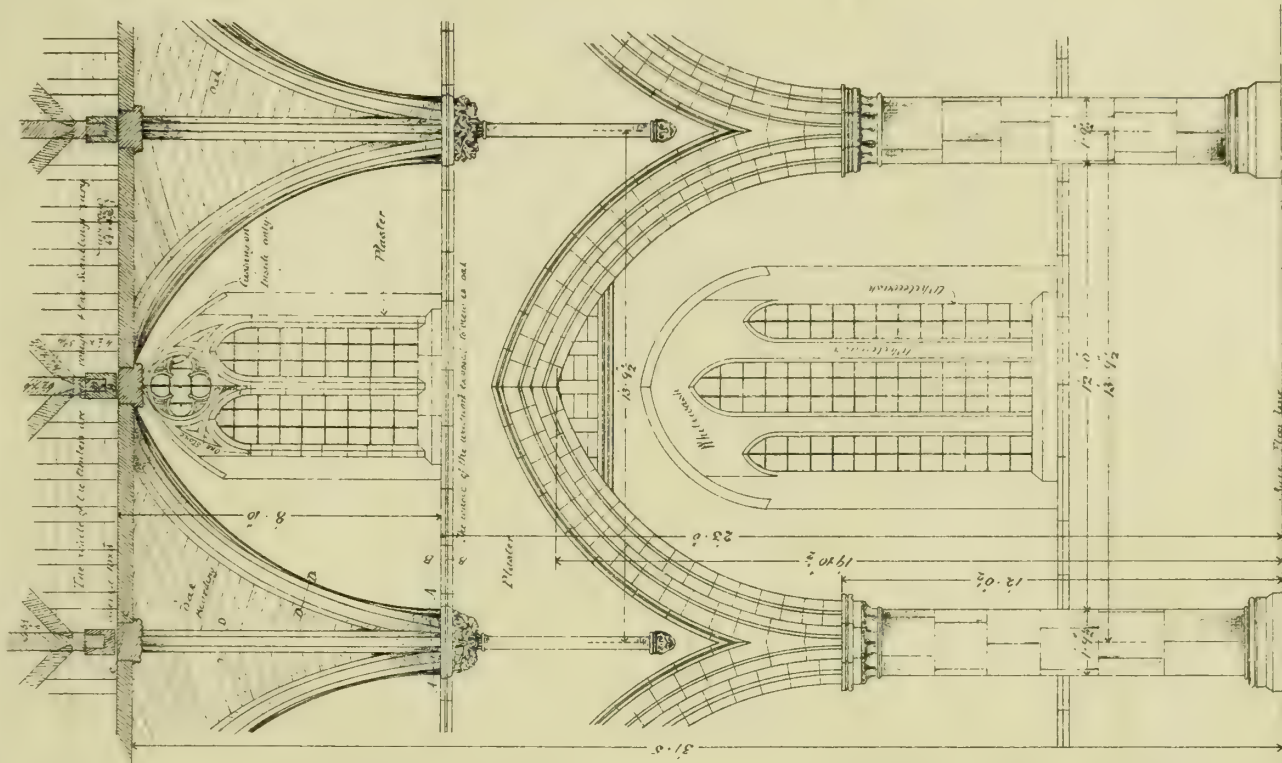
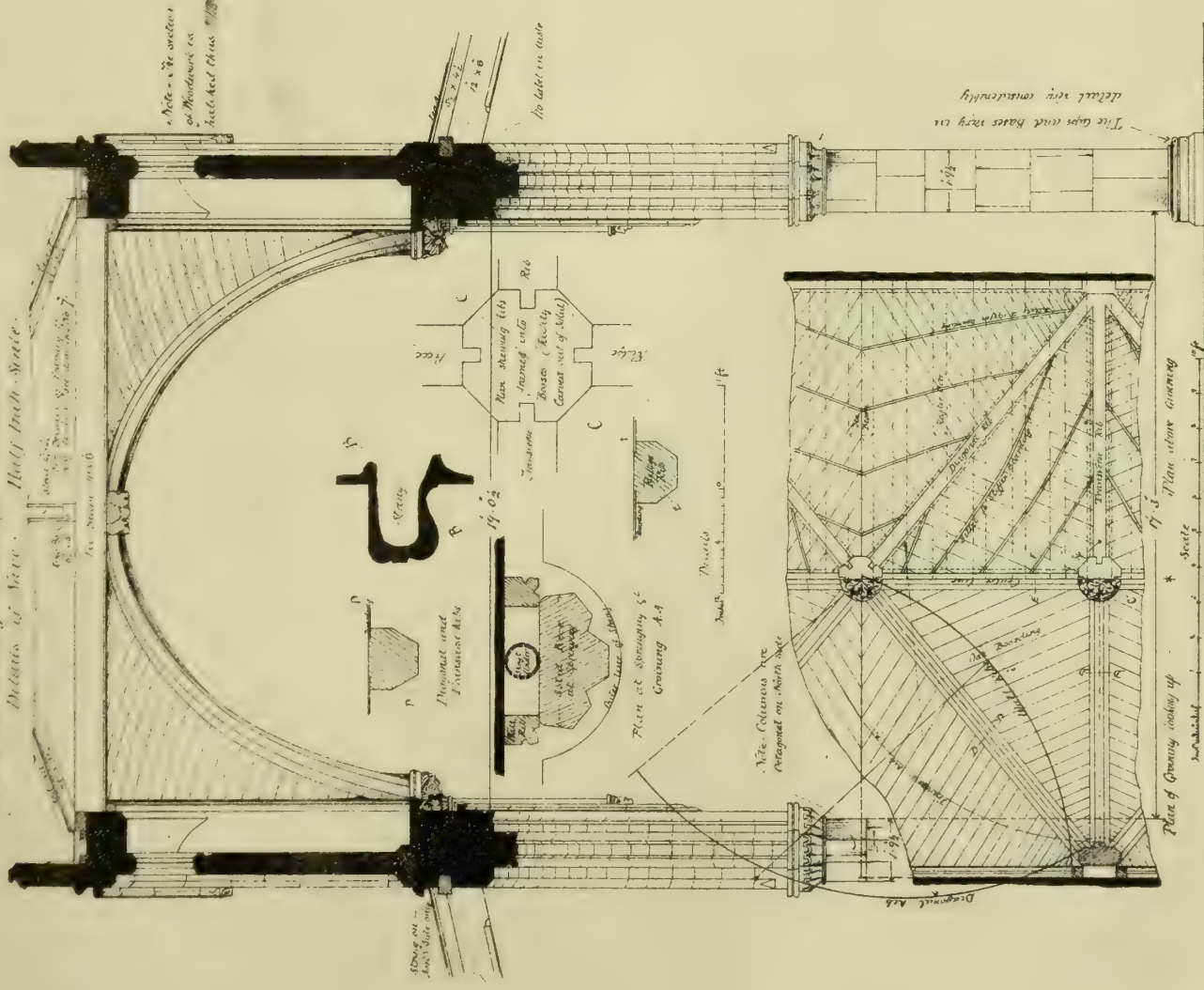
South Elevation.

Scale of Feet.

ROYAL INSTITUTE OF BRITISH ARCHITECTS SILVER MEDAL DRAWINGS  
MEASURED AND DRAWN BY G.D. OLIVER



Church of St Mary, Birmingham. - Vaults.  
Details of Vault. - Half Inch Scale.



Longitudinal Section of the Vault looking South.

Photo. (photographed & printed by James Akerman & Co. Gray's Inn Road W.C.)

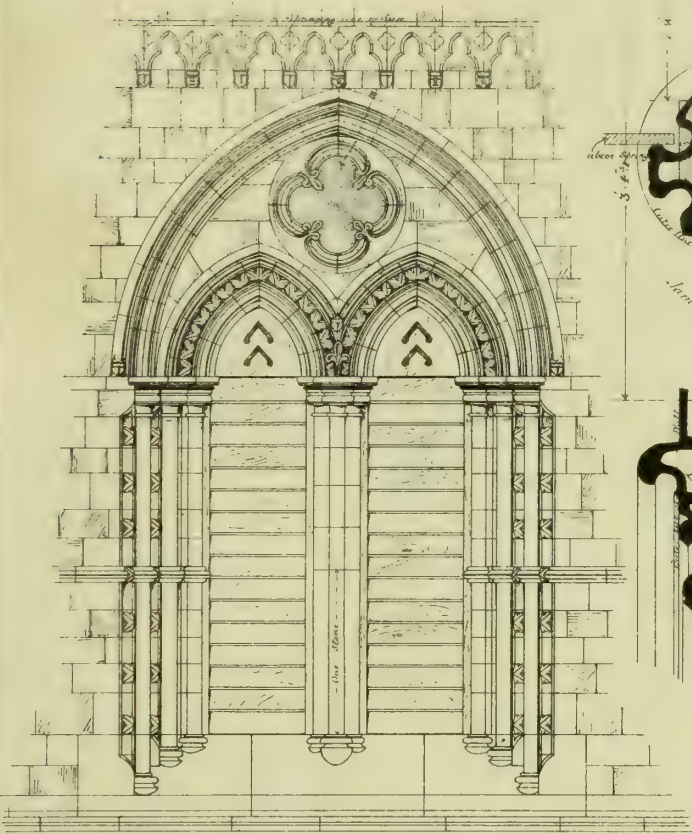






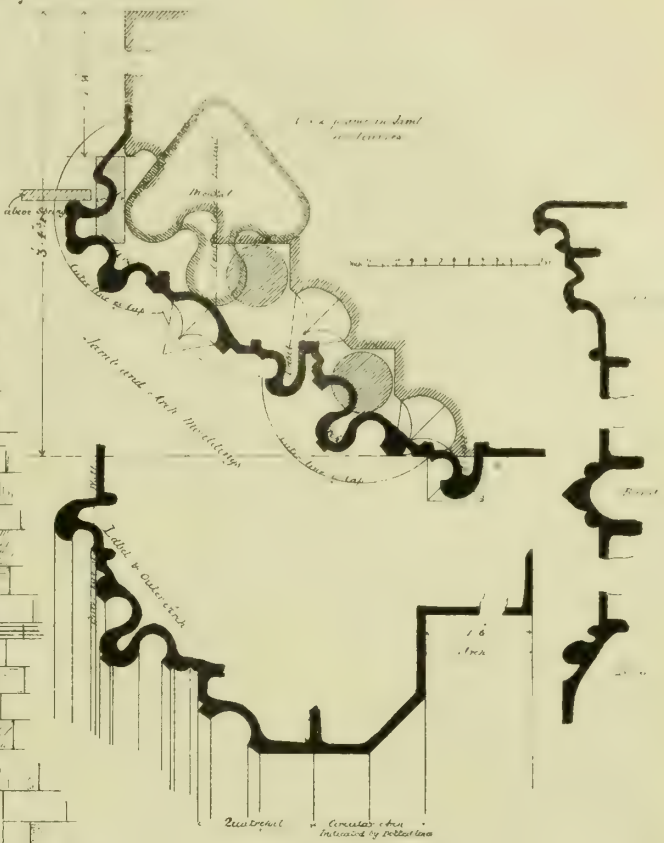
Church of S: Mary: Warmingtoun: Northants:

*Details of Belfry windows.*



*Elevation of Belfry.*

(East Side of Tower)



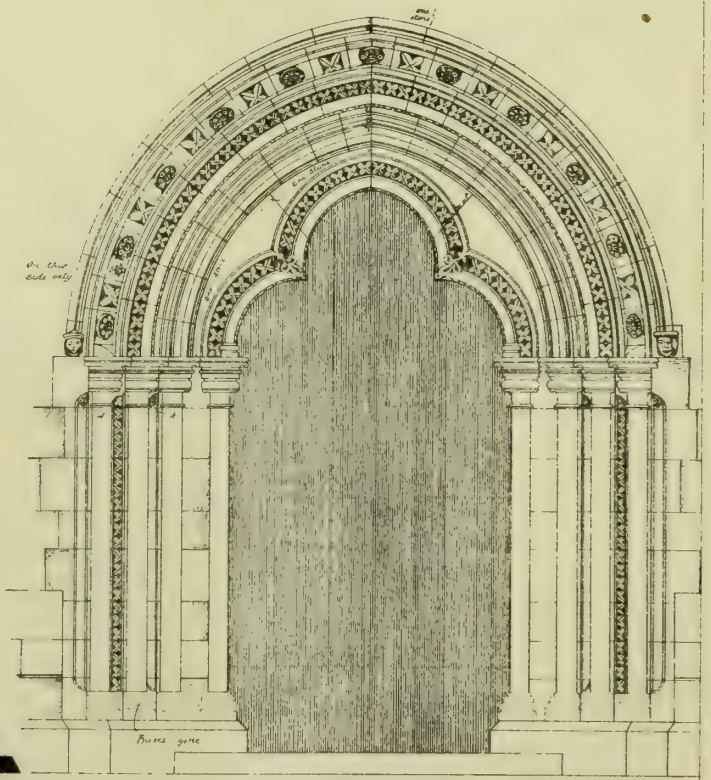
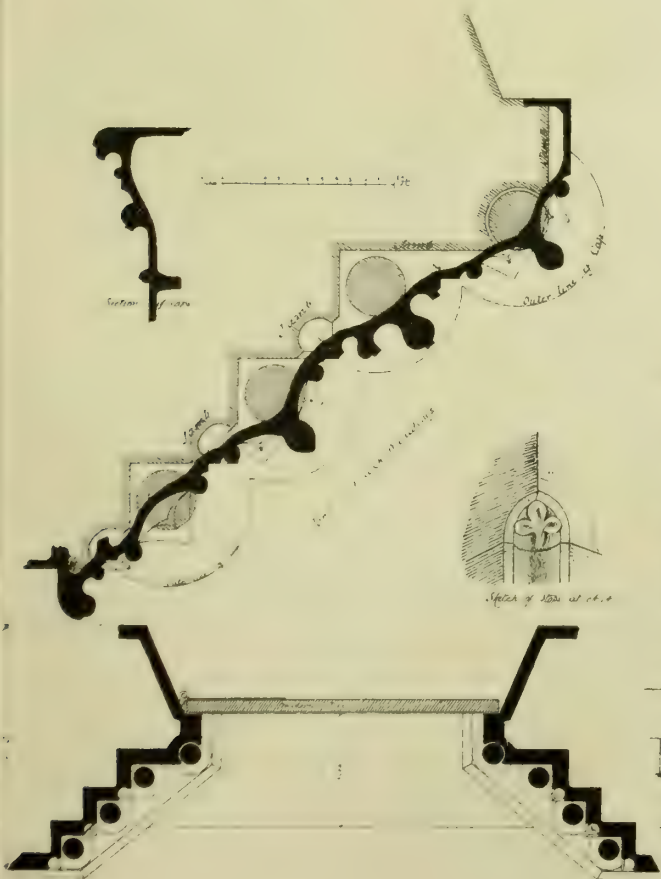
-Sichem einige Zeitpunkt A

Outer area be  $\frac{1}{2} \cdot A \cdot B^2$ .



Church: of: S: Mary: Warminster: Northants:

*Details of Nest Norway.*



*Elevation of Doorway.*









A. HARRINGTON ST. LIVERPOOL.

JAMES FRANCIS DOYLE ARCHT.

Parish Church, Neston, Cheshire.







## WATER-COLOUR PAINTING.\*

OF the various forms of art, there is, perhaps, no one of which less is generally known in this country than water-colour painting. In Europe, water-colours have long filled an honourable position in the world of art. In America, they have filled almost no position at all. Our artists, previous to the formation of the Water-Colour Club in New York, had made no energetic and successful attempt to cultivate a taste for them, either by producing good work, or by bringing it prominently before the people through an earnest and harmonious combination. It is true that here and there we find a name distinguished for excellence in this respect. Malbone (a contemporary and friend of Allston and Stuart), whose paintings on ivory have seldom been surpassed either in this country or abroad: Robert Jones, a pupil of Stanfield, and for many years a scene-painter at the old Tremont Theatre in Boston, whose works showed great power as a colourist; Thwaites, Hitchings, Hamilton, Vautin, Van Beest, Wheelock, Bellows, and perhaps a few others, have long been known among us for their excellence in this branch of painting. But there never was in this country so effective and so well sustained a movement in aid of this art as the one now begun in New York.

To define with the pen the exact rules for simplicity with the brush, though often attempted, has never yet been satisfactorily accomplished. It is almost certain that it never will be done, for the simple reason that it cannot be done. The world of literature and the world of art are distinct spheres. The pen can give but little help to the brush. But it may be said that artistic simplicity consists in judiciously stopping short of that point beyond which the material workmanship of the painter's hand cannot well pass, and where the work of the beholder's imagination should begin. "Painting," says Coleridge, "is a something between a thought and a thing." To the quality of simplicity the material of water-colour is especially adapted. Its inferiority to oils in some respects only heightens its superiority in others. Its delicacy and harmony in the blending of a general effect, its remarkable power of representing distance by aerial perspective, its chiar-oscuro, its luminosity, its liquidity and transparency, approximating to atmospheric light and prismatic brilliancy, are equalled by no other material for the purpose of conveying the refined and subtle poetry of which landscape art is capable. The peculiar excellence of water-colour painting lies especially in its capacity for expressing a sense of distance and light, or what a painter calls "aerial effects." This it does with a brilliancy and freshness unequalled. To what is this superiority due? To the pigments, to the vehicle, or to the ground? The pigments are the same, or nearly the same, as those used in oils. So that its excellence must rest either in the vehicle and the ground, or in the manner of applying the former to the latter. It lies undoubtedly in each. In the first place, paper properly prepared for water-colours is *white* (or at least light-tinted); secondly, it is *absorbent*; thirdly, it possesses a certain *roughness* or *granulous texture*. These qualities are characteristic of paper, and are possessed by no other material in an equal degree. In the rough surface, the little elevations receive and hold less colour, and the little depressions receive and hold more colour. The finest effects are usually produced by broad washes, applied with a rapid and accurate hand, and with a full brush; by these means the colour is floated over the paper-ground, and then allowed to lie quiet in its place until it sets and dries. As a rule, the less it is disturbed before dry, the better the result. What are called "accidental" effects, it is true, are sometimes produced in various ways, as by wiping out with bread, by hatching, stippling, &c. But floating washes are the distinctive peculiarity in the handling of water-colours. Both the vehicle (water) and many of the colours are transparent, or semi-transparent, and allow the white paper beneath to show through them more or less. The minute projections and cavities of the paper assist the effect of its whiteness, by creating an alternation of lights and half-lights, and casting infinitesimal shadows and half-shadows. Thus we see that the projections receive less colour but reflect more light. The cavities receive more colour and reflect less light.

These alternations of lights and darks, and variations in depth of colour, are harmonised by the wonderful capacity which the eye possesses, and are so blended together by it—though perhaps unconsciously to the beholder—as to produce those effects of luminousness and of tender gradations of airy distance which are the property *par excellence* of modern water-colour when rightly handled, and which it shares with fresco.

The idea is sometimes entertained that the art of painting in water-colours is a modern one. The English claim that it originated in England and with late English artists. In an extremely restricted sense—probably the one in which most Englishmen take it—there is perhaps a grain of truth in such a statement. The English Water-Colour School is, as the words imply, of English development, and of a comparatively recent date. It did not exist before Girtin and Turner; and even since Turner's death some improvements have been made in the technical processes.\* The art as at present practised had its origin in England from the custom of making what were called *stained drawings*. A class of topographical draughtsmen, in the latter part of the last century, were in the habit of touching their drawings, which were in Indian ink, with a few tints of local colour. In the South Kensington Museum there are specimens of such drawings by Webber (who accompanied Cook on his last voyage to the Pacific) and by Pococke, which were executed in 1790; by Rooker, in 1795; by Hearne, Alexander, and Payne (the inventor of the pigment known as "Payne's grey"), in 1796. These topographers were chiefly employed in making transcripts of the ruins of castles, abbeys, and cathedrals in England. Literal truth, minute and accurate copy of details, were their chief aim. Beauty, grandeur, sentiment, poetry—all the higher qualities of art—were unrepresented by them. But the men above named, with Paul Sandby, who died in 1809, Varley, Malton, Dayes, Byrne, and a few others, laid the foundations of what Cozens (a grandson of Peter the Great, of Russia) and Girtin and Turner subsequently raised to the dignity of art. Samuel Prout, Robson, Copley Fielding, Barrett, Rowlandson, De Wint, Dadd, Blake, Lewis, Harding, Hunt, Cattermole, and Cooper also deserve most honourable mention. The reader who is familiar with contemporary English art can readily supply other names deservedly eminent in this respect.

The form in which many are wont to think of water-colours is in the comparatively small easel pictures, adapted for hanging in frames on the walls of public galleries or private dwellings. But, in reality, fresco painting, tempera painting, scene painting, missal painting, and miniature painting are as much water-colour painting as what are distinctively called easel or cabinet pictures.

A wide survey of the history of art shows us that there have been, in general, four different methods of representing nature; namely, tempera, encaustic, fresco, and oil. Of these the oldest is undoubtedly tempera; then follows the encaustic painting of the Classic Greeks and their imitators; subsequent to this was the fresco of the Renaissance in the fourteenth and the fifteenth century; and last of all, after the middle of the fifteenth century, came oil. Modern water-colour is a modification of ancient tempera.

Water-colour painting is, in fact, not only an older, but a very much older, process than the use of oils. Water-colours were used by the Egyptians, the Hindoos, the Chinese, the Assyrians, and the Etruscans, long before the birth of Christ. The earliest work extant painted in the present method of using oils, according to Sir Charles Eastlake, is at Frankfort, Germany. Eastlake says its date is 1417, A.D. But a more recent authority sets it at 1444. It is consequently about 425 years old. The name of the artist who painted it is Peter Christophsen (called by Vasari, Pietro Christa), a scholar of Hubert Van Eyck. The earliest European water-colour extant is undoubtedly the one found in 1843 in Italy, in the necropolis of Veii. Its date, if it had one, antiquarians say would be about the time that Rome was founded, and it is consequently now about 2,600 years old. The name of the artist who painted it is not known.

Oil was undoubtedly employed in certain ways previous to the time of the Van Eycks. But the

art of painting in oils, as now understood, was probably invented by them.\*

It was the dictum of Michael Angelo that "oil painting was fit only for women and for the luxurious and idle." He acted up to his belief, for it is by no means certain that there is a single oil painting by Michael Angelo in existence. The reverse of this opinion seems now to be commonly entertained, and Michael Angelo's dictum about oils is held by many in regard to water-colours. It is a quite prevalent idea that the material of water-colours is adapted by its nature only to the lower ranges of art; that it is limited in its resources to pictures comparatively small in size, and to subjects of such a kind as are best characterised by the term prettiness; that neither force nor feeling can be expressed in this material, but only feebleness; that, however successful it may be in rendering grace or beauty, strength, and grandeur are beyond its grasp. On the other hand, it is often believed that the higher ranges of art are monopolised by oil; that the best expression of the noblest ideas is only to be found within the resources of this latter material.

To see that such an opinion is a mistaken one does not require a long consideration. Most of the great painters of the Renaissance won their immortal fame by water-colour. It is by water-colour that a very large proportion of the noblest and highest achievements in art has been accomplished. Cimabue, Giotto, Masaccio, Ghirlandaio (Michael Angelo's master), Michael Angelo, Perugino (the master of Raphael), Raphael, Leonardo da Vinci, Fra Angelico, Filippo Lippi, Andrea del Sarto, Andrea Mantegna, Correggio, and the great host of the Renaissance were water-colour painters. Buonarroti's paintings of "The Creation" and "The Last Judgment," in the Sistine Chapel, Correggio's paintings in the Cathedral of Parma, Raphael's "School of Athens," "The Scourging of Heliodorus," and his other paintings in the Loggia and Stanze of the Vatican, are "only water-colour paintings." And the history of water-colour or fresco painting in the revival of art in the fifteenth century is the history of art itself. Moreover, the practice of fresco has been renewed in modern times, and many of the chief pictures of Germany, England, and France have been executed in this method.

Fresco (the Italian adjective *fresco*, *fresh*) is the name given to mural paintings which are executed on freshly laid plaster. It is not, therefore, exactly synonymous with *tempera*, as this latter term is properly applied only to paintings on *dry* plaster. The *tempera* process is probably far older than that of real fresco. The latter was not much in use till near the end of the fourteenth century. The method of working in fresco is, in general, as follows: First, a finished sketch in colour of the intended picture is made. This may be either of the same size as the proposed fresco, or it may be smaller. The outlines of the design are carefully drawn on thick paper or pasteboard, which is securely fastened to a cloth stretched on framework. The sketch on the cartoon is then transferred to the wall. Different methods of conveyance are made use of. By some, tracing-paper is laid on the cartoon, and the design traced upon it. The tracing is then put upon the wet plaster, and the design pricked through. By others, a blank sheet of paper is placed behind the cartoon, the design pricked through on to the sheet, the sheet laid upon the wall, and black powder dusted through the holes of the paper on to the plaster. Still another method is to draw a series of small squares upon the cartoon, and also another series of larger squares upon the wall. By aid of these to guide the eye, the transfer is made. Thus the use of the cartoon by the fresco painter is similar to that of the clay or wax model by the sculptor.

The pigments used are chiefly earths, since the chemical action of the lime destroys animal and vegetable colours. Lime is mixed with them in fresco and *secco*, but not in *tempera* painting. Great attention was paid by the ancient and Renaissance painters to the careful preparation of the grounds, which were either of burnished gold or white plaster, as the luminosity of the picture depends on these being preserved pure and clean.

The fresco painter has many difficulties to contend with, arising from the nature of the materials with which he works. This is especially the case with true fresco (*buon fresco*) as distinguished

\* An Essay read by Mr. HENRY S. MACKINTOSH before the Boston (U.S.) Art Club. (From the *Atlantic Monthly*.)

\* Turner died in 1851. The first public exhibition of modern water-colour paintings in England took place in the spring of 1808.

\* John Van Eyck, who did the most towards developing this process, was born some time between the years 1390 and 1395. He died about the year 1445, or almost exactly at the time of the invention of printing.



from dry fresco (*fresco secco*), otherwise called *mezzo* (half) fresco or "Florentine" fresco. Strictly speaking, there are three distinct kinds of wall painting, namely, the true fresco, which is executed on wet plaster, and with colours mixed with lime; second, the dry fresco, also executed with lime colours, but on plaster which has dried and been remoistened; third, tempera (or more commonly, *distemper*), without lime mixed with the colours, and on a dry wall. It is quite common to use the terms *secco* and *tempera* (or *distemper*) as synonymous, though, speaking accurately, there is the above-mentioned difference.

Discoveries of old fresco and tempera pictures—some beneath whitewash, others beneath accumulated rubbish—are frequently made at the present day. As examples, may be mentioned those found in 1863, in England, in Astbury Church, Cheshire; those in Stone Church, Kent; and those in Eaton Church, near Norwich. These were probably executed about the beginning of the fourteenth century. In France, paintings in *secco* have lately been exhumed in the rooms of the Roman Villa in the Department of Allier, near the railway-station of St. Gerand le Puy. The villa belongs undoubtedly to the Augustan age, and at the breaking out of the Franco-Prussian war was undergoing excavation.

Modern chemistry has supplied another method for wall painting, called *stereochromic*. It possesses some advantages over ordinary tempera, on account of its supposed greater durability and the facility with which paintings done in this method can be glazed and retouched. It was invented by a well-known chemist, J. R. von Fuchs, of Munich. The essence of the invention consists in mixing fluoric acid with a proper proportion of water; this mixture is then profusely sprinkled over the picture. The chemical action of the solution ("water-glass," as it is called) renders the colours, and the plaster on which they are laid, one uniform flint-like mass. A longer time, however, than has yet elapsed since the invention of this process is necessary before its merits or defects can be definitely ascertained.

One of the great troubles in the management of fresco consists in the fact that the eggs which are mixed with the colours to render them of the proper consistency, dry so rapidly that it is difficult to unite the tints in the more nicely-modelled parts of a picture. But this technical difficulty is in reality productive of a virtue; for it renders retouching impossible. In oil painting it is practicable to retouch, to glaze, and to use numerous appliances known to painters, by which the desired effect, if not produced at first, can yet be subsequently obtained. But in fresco painting this is out of the question. The plaster in drying forms a crystalline surface, which gives a clearness and sharpness much superior to that of which *distemper* is capable; and great care is required in the manipulation, because the stucco has only a limited capacity for the absorption of colour. If this capacity is overworked, the plaster becomes what is called "rotten." The rottenness is not perceptible until after the plaster is dry, so that the artist must thoroughly understand his business, must possess an experienced judgment and a swift and resolute hand, before he can produce good and durable work. This necessary simplicity in the manipulation compels the fresco painter to avoid the display of mere mechanical skill—the parade of artistic fireworks, so to speak. Soft and delicate finish, roundness, depth of colour, and all the other inferior resources of art, are therefore placed beyond his control. It is impossible for him to conceal poverty of invention or of poetic feeling behind the mask of artificial decoration and mechanical elaboration. Simplicity and breadth of treatment, grandeur, harmony, truth, and purity of character, nobility of composition and expression,—the higher qualities of true art,—are the only fields in which he can display his triumphs. Without these he is nothing. Vasari has rightly called fresco "the most manly of all modes of painting."

Coleridge says that the measure of greatness in a work of art is its *suggestiveness*. He means, possibly, that great work is never simply specific in effect, but carries the spectator out of himself, as it were, and beyond its own mere surface into an atmosphere akin to that in which the work was created. There must, therefore, be a greater or less degree of sympathy and congeniality between the mind of the beholder and the mind that creates. The effect of a great work of art is not one of sense alone. It is an effect not to be looked for in the work of little men; it is a spiritual essence—a

quintessence beyond them, intangible and everlasting. We can, it is true, lay down the dictum that a work of art, to be the most complete, must exhibit in itself an excellence in the three directions of sensuous, of intellectual, and of spiritual beauty. But it is this intangible quality of suggestiveness which exerts the greatest influence on the true lover of art, be he professional artist or humble layman. When we see more with our minds than we can with our eyes, then comes the keenest delight.

This property of suggestiveness is a vital element of the simplicity and grandeur of fresco painting, and it led the great artists of the Renaissance, even after the invention of oil-painting, to select fresco as fittest for the expression of their best thoughts. The necessity of forbearance in the technical management of frescoes; the inevitable law that in them all cannot be said, but that much must be left unsaid, enhance their purity and unity of design, and appeal to the spectator in a manner that, if he is of susceptible fibre, fills his mind with visions of purest delight. In their proper treatment all profusion of ornament is avoided, and their greatness is not infringed by a multiplicity of constituent parts. An easel water-colour ought, in a less degree, to possess these characteristics of fresco. Dignified simplicity and directness should be the first objects aimed at. Elaboration is not its appropriate possession. Even rudeness and roughness, if accompanied with a manly breadth, are better than the most patient minuteness of detail. One of the chief requisite conditions in a work of art is that it should be rendered without confusion. When a water-colour becomes elaborate in texture, and in what is called *quality* of colour, it infringes on the peculiar province of oil-painting, and the painter wastes his time.

Besides fresco and tempera, water-colour painting had an immense field for its development, especially during the Middle Ages, in the widespread fashion of ornamenting manuscripts. Miniature illumination, particularly as practised in its later days, was a new resource in art, distinct from fresco and from oil. The illumination of MSS. forms the principal existing link between ancient and modern art. For those two enemies of art, time and barbarians, have destroyed nearly all the other varieties of pictures. It is chiefly in the illuminated Bibles, missals, rubrics, psalters, hymnals, chronicles, and other MSS., handed down to us by their royal or monastic owners, that we can find specimens of the art of painting as practised in Europe in the time between the fifth and twelfth century. Paintings on walls, canvas, or panels are of necessity more exposed to injury and destruction than paintings in books, these latter being easily deposited in places secure from violence; and the books being kept closed, the pictures they contain are protected likewise from atmospheric influences. It is not true, however, as Vasari and other writers have frequently asserted, that art in forms other than illuminated books was not cultivated in Italy during the period from the fifth to the thirteenth century.\*

Without coloured illustrations it is impossible to give a completely definite notion of the art of illumination; and half a dozen pages are small space in which to review the work of over a thousand years. A careful comparison of the many MSS. extant shows—as is natural from the fact that the art of illumination was practised for fifteen hundred years or more, and by many nations, European, African, and Asiatic—widespread diversities in design and execution. The different nations naturally formed different schools of art. And an elaborate treatment of the subject (impossible in these pages) would require a consideration of the different styles of Byzantine, Greek, Latin, Frank, Gallic, Franco-Gallic, Celtic, Anglo-Celtic, Saxon, Persian, Arabic, Hindoo, Japanese, Chinese, and all the other varieties of European, Asiatic, and African art.

Miniature painting is the term originally applied to the practice of illuminating books with coloured letters, previous to the invention of printing. The word miniature is an instance of the change always taking place in language. The primary meaning of the word *miniature* is *red-lead*, from the Latin *minium*. Now it signifies, of course, a portrait of small size, usually executed

on ivory or vellum. In the Middle Ages it was the custom of the book-writers to distinguish the beginning of chapters and paragraphs by marking the initial letters in minium or red-lead. This practice was the humble beginning of what subsequently gave employment to some of the great artists of Europe and Asia. By degrees these red letters—at first used simply as a matter of practical convenience, to distinguish the beginnings of paragraphs—came to be adorned with many fanciful ornaments, the illuminator adding arabesque borders and scroll-work, and finally little pictures containing birds, animals, foliage, fruit, flowers, insects, human and imaginary grotesque figures, unicorns, griffins, chimæras, and other fantastic creatures, illustrative of the context. To this the general term miniature was applied. The name of the material in which they were done was thus transferred to the pictures themselves. At first, the initial letters were of the same size as the rest of the text; but by degrees it became the custom to make them larger than the other letters, so that in some MSS., especially the choral books of several of the Italian churches, they range from 2in. to 24in. in length.

To the historian as well as to the artist, the illuminated books of the Middle Ages are invaluable. For, besides exhibiting the development of art, they supply the most accurate illustrations of the social manners, the religious conditions and customs, the utensils, arms, furniture, dress, and architecture peculiar to the times and countries in which they were produced. One of the first pictorial evidences of a knowledge of the existence of America is to be seen in a painting of the Adoration, belonging to the Chapter House at Viseu, Portugal. In this picture one of the Magi is represented in the dress of an American brave. From miniature illumination very valuable information on the subject of topography is to be obtained. For the illuminator followed the general practice of most of the early painters in similar cases: they painted what they saw. Rembrandt, when representing the Nativity, for example, gives us the view of a Dutch cowhouse, and not that of a Jewish stable; Raphael pictures a Roman matron for the mother of Christ; a Burgundian, in painting the fall of Adam, represents the fruit of the Tempter as a bunch of grapes, while a Norman makes it an apple, and a Provençal, an orange. So the Mediæval limner, in illustrating the Bible, introduced scenes which were familiar to his own experience. Suppose, for example, he were a Frenchman illustrating the Crucifixion. Instead of attempting a view of Jerusalem, which he never has seen, he simply inserts for a background in his miniature a view in Paris or some other French town. And we thus obtain a correct idea of how Aix-la-Chapelle appeared when Charlemagne made it his residence, or how Notre Dame or the Louvre looked to the painter's contemporaries. What is called the Talbot Book, given to Margaret of Anjou by Talbot, Earl of Shrewsbury, contains, among numerous tales of chivalry, the life of Alexander the Great. There is a miniature in it of a view of Babylon, in the foreground of which is a very neat row of water-mills, such as the painter daily saw around Ghent or Bruges. In Queen Mary's Prayer Book, a MS. of the thirteenth century, is a drawing illustrating the death of Absalom. Absalom is represented hung to a tree, dressed in a coat of chain-mail, and surrounded with knights and war-horses of the days of chivalry. Joab, likewise in armour, with his visor down, is busily at work, spearing Absalom with a long lance. Another MS., of the fourteenth century, represents King David playing, not upon the harp, but striking a row of silver bells after the manner of the Saxons; David is attended by four other figures, playing respectively on a harp, an organ, a violin, and the bagpipes. In a medallion of Juvenal des Ursines, of the fifteenth century, which represents the shepherds receiving the glad tidings of the Saviour's birth, there is a landscape of the river Seine, with accurate drawings of the church of Saint-Jean-en-Griève, the Petit Châtelet, the Butte Montmartre, and the Tower of the Temple.

This kind of decoration, like tempera and fresco, existed before the Middle Ages, and even before the Christian era. The ancient Egyptians illuminated their papyri with elaborately-painted vignettes, similar to those of the Catholic missals. The Greeks and Romans had a like custom. In Europe, its early history is quite obscure. It seems to have been practised by Byzantine artists about the third or fourth century. The earliest Greek illuminations are very simple, being not

\* See "Studii sui Monumenti dell' Italia Meridionale dal IV. al XII. Secolo," by DEMETRIO SALAZARO, Inspector the Pinacoteca in the National Museum at Naples. The work is illustrated with excellent chromo-lithographs, after fresco mural paintings, some of them executed as early as the fourth century.



much more than a mere framework around the page, with a coloured border. A few pictures are introduced in this early work, square in shape, and likewise surrounded with a border and a dark margin. Among the oldest extant specimens of illuminated books are a copy of Terence in the library of the Vatican, supposed to be of the fourth century, and the Dioscorides of the Vienna Library, executed about 354 A.D. The Vatican Virgil is also one of the most ancient. It contains about fifty miniatures, and was written in the fourth or fifth century. The oldest MS. in the British Museum is the Codex Genesios, probably of the third century; all but a few leaves was unfortunately destroyed by the great fire of 1731.

It was in the latter part of the Middle Ages—the period between the ninth and the sixteenth century—that this art was brought to its perfection. Like the mural decoration of the Renaissance times, illumination owes its development to the Christian church. To the embellishment of missals and breviaries the Mediæval monk resorted for the purpose of recording his piety by painting his ideas of sacred subjects, or of whiling away the *ennui* of cloister life. There was also another incentive in the fact that a peculiar merit was attached to this kind of work. The following subscription is found on many Mediæval MS.:—“This Book, copied by X—, for the Benefit of his Soul, was finished in the Year —. May the Lord think upon him.” The persecutions of the early Christians repressed the growth of this art for the first two or three centuries. But with the accession to the Roman empire of its first Christian ruler, Constantine, in 306, the art received a vigorous impulse. In the year 305, St. Anthony first established convents, in which were collected the devotees of religion, previously compelled to live in secret places. These convents were so many laboratories for copying and illustrating MSS.

Large numbers of illuminated books are preserved in the various libraries and private collections of Europe. It is not improbable that there are rich and unexplored mines in the Eastern convents, especially of Arabic and Persian work. For during more than one thousand years, that is, from the reign of Constantine in 306 A.D., till the capture of Constantinople by the Turks in 1453, and the growth of learning in Western Europe, that city was the chief seat of scholars and of book-making. The business of transcription and embellishment was most assiduously carried on, not only in the city proper, but in the monasteries of its suburbs, and throughout Asia Minor and the islands of the Ægean Sea. Cyprus, Eubœa, and Crete were especially prolific. No place was more productive than Mount Athos, which stretches into the Ægean Sea from Macedonia. The promontory was literally honeycombed with monasteries, the occupants devoting most of their time to this work, which they have even handed down to their successors of the present day. For at the breaking out of the Greek revolution in 1828, there were more than twenty monasteries on Mount Athos, containing over four thousand monks, most of whom were picture-makers. And in 1846 Papeti found them still illuminating books, guided by ancient models and by a receipt-book, the latter containing the most minute details in regard to the costume and even the facial expressions of all the saints in the Greek calendar.

It was only about a quarter of a century ago that one of the oldest known specimens of Scriptural illumination, if not the oldest, was discovered at Jerusalem by Poujoulet, a French traveller. He describes it to be a Bible, probably of the fourth century, executed in a coarse style of Byzantine art, containing miniature paintings representing the chief Scriptural personages from Adam to Christ. During the past four hundred years frequent visits have been made by European travellers and men of learning to the Egyptian monasteries, for the purpose of unearthing MSS. Amongst these visitors may be mentioned Robert Huntington, who, in 1678, made the collection of Oriental MSS. now in the Bodleian Library at Oxford, England. In 1715, Asseman and Sicard gathered for the Vatican a number of Coptic, Syriac, and Arabic books. In 1730, Sieur Granger visited the Natron monasteries of North Africa. He says, “The buildings at that time were falling into decay and the dust destroying the books and MSS., of which the monks made no use whatever. Their own patriarch had represented to them that the sum which the books would produce would be sufficient to enable them to restore their churches and rebuild their cells; but they declared they would rather be buried in

the ruins” than part with their unused books. A hundred years later, Lord Prudhoe, in 1828, visited these same monasteries. He says that in one chamber he found a trapdoor, through which he descended, “candle in hand, to examine the MSS., where books and parts of books in Coptic, Ethiopic, Syriac, and Arabic were lying in a mass, on which,” he says, “I stood. To appearance it seemed as if on some sudden emergency the whole library had been thrown, for security, down this trapdoor, and that the books had remained undisturbed in their dust and neglect for some centuries.” The British Museum has quite a large collection of MSS. made by Dr. Tattam, who twice went to Egypt solely for that purpose. In a vault of one of the monasteries he found the floor covered eight or ten inches deep with the fragments of books, which had apparently lain there many years. Over one thousand MSS. were collected from Egypt, Asia, and Mesopotamia, written in the Syriac, Aramaic, and Coptic dialects, and at different times between the fourth and the thirteenth century. Most of the MSS. above-mentioned have been secured for European libraries. But these instances, and especially the late discoveries of Papeti, Poujoulet, and Dr. Tischendorf (an account of whose finding of the Mount Sinai Bible is in the preface to the thousandth volume of Tauchnitz’s publications), lead one to hope that, in spite of previous active search, there may yet be found still more additions to our treasures of mediæval limning.

Subsequent to the fifth century, the influence of Christian art is plainly visible. In the sixth century a stimulus was given to illumination by St. Benedict. The influence of this remarkable man over the monastic institutions of Western Europe was felt for a period of three hundred years. It was in the year 500 that, coming from Asiatic Greece, he established numerous convents in the West of Europe. The rules of life which he originated were adopted universally by the different religious communities; and they were exclusively observed until the ninth century. St. Benedict’s last dying injunction to his brethren was, “Read, copy, and preserve books.” In the eighth century many Eastern artists were dispersed over Western Europe by the Iconoclastic Emperors of Byzantium. Charlemagne took advantage of the expulsion of ecclesiastics and artists from Byzantium, and afforded them a generous support and employment at his court and throughout his empire. The Byzantine style of art, which from the idiosyncrasies of its Eastern character is readily distinguished from all others, was thus gradually amalgamated with that of the Frankish and Teutonic schools, and a great improvement made over the coarse and rude productions of the Empire of the West. During the ninth century the ecclesiastical power was much extended, and with it the production of missal paintings. Byzantium was still the place where the greatest technical perfection was attained, but its influence extended throughout Western Europe and even invaded Ireland. The art continued to advance for the next hundred years. The Menologium is the name of a celebrated calendar made about the year 1000 for Basilus II. Although nearly one-half of this book is lost, only the months from September to February, inclusive, being left, there still remain about 430 miniatures on grounds of gold, illustrating scenes from Church history. Near the beginning of the eleventh century there was a marked decline in art, but it again received an impulse from the Church. Gregory VII. issued his fiat announcing the universal dominion, temporal and spiritual, of the Roman Church, and the gorgeous cathedrals, especially those of Southern Europe, began to glow with the productions of artists. The first crusaders, on their return from the Holy Land, likewise aided the movement by bringing with them a demand for Eastern luxury. This luxury is apparent in illumination, in the increased practice of writing copies of the Bible in letters of gold or silver, on leaves of vellum stained with a beautiful purple.

Four circumstances in the twelfth century contributed as many impulses to the culture of the fine arts, namely, the growth of the power and wealth of the trading classes; the establishment of universities; the rise of the Italian republics; and the adoption of miniature illumination by the Arabs, the Tartars, and the Persians. The peculiar decoration styled arabesque was, as its name imports, developed by the Arabs. The Arab artists were compelled by an article of their faith to resort to the depicting of the flowers, stalks, fruit, and leaves of plants, or to the imaginary productions of their fancy. As this people ad-

vanced in luxury, however, under the dominion of the caliphs, they gradually introduced the representations of insects, birds, and quadrupeds. In the thirteenth century, the art continued to improve. In the opinion of Ruskin, the thirteenth century is the period of the climax. About the year 1200, illuminators began to use foliage in illustrations; and it was during this period that the peculiar species of illumination known to bibliographers as “bestiaries” flourished. It takes its name from the numbers of real and imaginary animals, fantastic and grotesque, with which the illustrations are filled. In the fourteenth century, Cimabue and Giotto, with their predecessors and immediate followers of the Greek school, were the precursors of the great era of the Renaissance. And the miniature art of the time gives token of their influence.

In Flanders the churchmen adopted a method of instructing the ignorant populace by miniature illumination precisely the same in principle as that for which fresco was used. Pictorial representations of the most important subjects in the Scriptures were issued under the name of the *Armen Bibel* (*Biblia Pauperum*) or “the Poor Man’s Bible.” The earliest specimens of this book contain a series of forty leaves, exhibiting illustrations of the Old and New Testaments. It was designed not only for laymen, but for unlettered priests. Each page of this book contains three designs arranged in a row, the central picture illustrating some scene from the life of Christ, and those on either side scenes from the Old Testament, showing a parallel or collateral incident. For example, the “Adoration of the Magi” is flanked on one side by “Abner visiting David,” and on the other by the “Queen of Sheba’s Visit to Solomon.” The illustrations are accompanied with an explanatory text. The leaves, put back to back, are gummed together in imitation of a book printed on both sides. This invention extended from Flanders to other countries.

Beside Scriptural subjects, other classes of works received the attention of the illuminator. The songs of the Troubadours, and metrical and prose romances, furnished many themes for the artist’s fancy.

In the fifteenth century large quantities of MSS. were brought to Western Europe from Constantinople by the Greeks, who fled from that city after its capture by the Turks in 1453. And in the Italian cities great numbers of scribes and illuminators flourished, there being over fifty in Milan alone. Some of the most renowned artists were engaged in this work. Limning in its earlier days was cultivated almost entirely by ecclesiastics; in its later days, laymen and professional artists shared the labours and the glory of the monk. In Italy are to be found Fra Angelico da Fiesole, Simone Memmi, Giotto, Franco Bolognese, Squarcione, Gherardo of Florence, Gentile da Fabriano, Girolamo, and Francesco dai Libri (contemporaries of Da Vinci), Da Vinci himself, Raphael, Titian, and, perhaps the greatest of all in this art, Giulio Clovio. In the Low Countries, the three Van Eycks, Roger de Bruges, Van der Goes, and Hans Memling, rivalled, if not surpassed, their Italian brethren. The passion for illumination was so great in this century, that even medical diplomas and legal documents were adorned with it. The fifteenth century and the first quarter of the sixteenth century was the time of the climax of this art. It received a mortal blow, though one not immediately fatal, from the invention of printing. With this invention the demand for MSS. of course gradually ceased, although illumination was applied to printed books for full a century afterward, blank spaces on the pages being left by the printer for the painter. For more than a hundred years after the invention of printing, official illuminators were retained by the Apostolic Chamber, the Popes of Rome, and the Doges of Venice. It was not till the reign of Louis XIV. of France (1643) that the art became practically extinct. The latest of the illuminated missals, according to Madden, is the immense folio in the Library of Rouen. It is almost 3ft. high, and employed its limner, a monk of St. Andoën, during thirty years of hard work. It was finished in 1682.

#### OXFORD ARCHITECTURAL AND HISTORICAL SOCIETY.

THE last walk for this term of the members of this Society took place on Saturday week, when the party first visited St. Mary Magdalen Church, which is now undergoing a complete



restoration. The Rev. Cecil Deedes, the vicar, in a short address, gave a description of the church. It consisted of a nave and two aisles, one on each side, and on the south was what used to be called a Lady Chapel. In the north aisle there were formerly two small chapels, one of which was used as a vestry, and the other as a registry. The south aisle was then approached by steps to the chancel and altar, at about a height of 4ft. above the level of the floor, proofs of which could still be seen. The chapel in the south was given by Edward II. to some Carmelite Friars, and it appeared that it was their chapel. It was separate from the body of the church at that time. The object of the restoration was to make the church what it originally was. The gallery which used to run along the west side was an eyesore, and it blocked up that end. When the gallery was put up considerable damage was done to a very fine arch, which would have to be replaced; and in removing the pews they had found that the bases of some of the pillars were cut about very much. Mr. Parker, in his "History of Oxford," said that no part of the walls was of later date than the fourteenth century, and there had been two restorations before that time. By the removal of the gallery they had thrown open the fine west window, the finest probably in the church. The east end would be raised, but they could not go very high with it, on account of dwarfing the present pillars. The old chamber above the south porch had been disused for many years, and Dr. Ingram, in his "Memorials," spoke of it as being stopped up. In removing the gallery at the west end they had brought to light a very small window, which was apparently a hagioscope, and commanded a view of the altar. It was in Henry VIII.'s time that a rood-loft was put up, and an oak chest of that time, which had contained jewels and several very curiously carved objects, they now had. The north aisle, or chapel, was for a long time used by Balliol College as a chapel until the fifteenth century, when the College had leave to build a chapel of its own.

Mr. JAMES PARKER said that before the north aisle was built the southernmost was probably the chancel, and was used as such, simply because it was somewhat higher than the rest of the church. A great advantage which they had that day, and which they never had before, perhaps, was that they were able to see in the south aisle the window arches of the crypt which was underneath it, that was to say, half of it was above the ground outside and half below it. The three windows there enabled them to judge of the height of what he might call the raised choir. It so happened that that suggested to him a circumstance to which he had called attention the previous Saturday. They then visited a fine church, and it was curious in this way. There were two churches in the diocese which were representatives, the one of the other, and these were St. Mary Magdalen at Oxford, and St. Helen's at Abingdon. There were no two other like churches. Each consisted of naves and aisles set side by side, and in both the width of the church was longer than the length. At St. Helen's they had now completed a restoration, and they there saw what all much admired, and what he believed to be, without exception, the finest woodwork in the diocese—a splendid screen. He did not know whether they were going to have a very fine screen at St. Mary Magdalen; but one thing had struck him and others, that its effect would be lost very much, as that at Abingdon was, if the floor of the chancel was so low. By another curious coincidence they visited—whether rightly or wrongly—a Wesleyan chapel, a very fine Gothic building, and here they found that the floor of the choir was raised fully 2ft. above the floor of the nave. It was of great importance, where they had a wide building and a great expanse, that the level of the choir should be raised in order to give it dignity. He did not know how far it would be carried out in that church, but it seemed to him, though he did not wish to interfere with any plans which might be proposed, that the present floor of the chancel on which he was standing was wanting in height. The history of that church seemed to have been a remarkable instance of never having been left alone. Every 50 years something was done either in the way of rebuilding or tinkering in it in some way or another.

A visit was then made to the tower of St. Michael's Church where the architect from whose plans the work of restoring the tower is being carried out (Mr. E. G. Bruton) met the visitors, and explained a few details concerning it. It was

one, he said, of a very peculiar kind. It was not a campanile nor an ordinary Church tower, and it was probably built by Robert D'Oyley, Governor of Oxford, in 1066, and probably was a defence of the outworks, as was also St. George's tower, the keep at the Castle, and there was a great similarity between the work in the two. The base of St. Michael's tower, although of considerable substance, was no thicker than the top of the one at the Castle, so that it could be placed on the top of it, as it were; but he merely mentioned the fact to give some idea of the strength and solidity of the Castle tower. Speaking of the restoration of the tower, he said that he went up in the belfry when the bells were ringing, and found one part of the tower vibrating at a different ratio to the other, which was a great danger, and the result would be, sooner or later, the parting of the one from the other. One plan to preserve it was by tying it together with iron rods, but there was danger in that because of the contraction and expansion of the metal at certain times of the year. He had adopted the plan of erecting a bracketed cradle of oak timbers inside, which would be bolted with iron bars through the walls, and the bars, consequently, would be but a few inches longer than the thickness of the walls. Another peculiarity was a doorway leading out to the north, and he had no doubt that it was an approach to that part of the tower.

Mr. JAMES PARKER thought that the door was a way for the garrison to go out to man the walls, and he thought that showed the military character of the tower rather than its ecclesiastical purposes in those days.

From here a visit was made to the cellars under the Town Hall, to those under the house No. 104, St. Aldate's, and to those at the top of St. Aldate's, in the whole of which the Gothic and other styles of architecture were pointed out by Mr. Parker, and various periods of antiquity ascribed to each. The walk having then terminated, the party separated.

The annual meeting was held in the Taylor Building on Wednesday week.

#### SCHOOLS OF ART.

LEICESTER.—The annual meeting of the Leicester School of Art took place on Tuesday week. From the report of the committee it appeared that the attendance of students, and their progress and success, had been satisfactory. The income of the school had slightly exceeded that of the previous year. A plan of a new school building, which it was believed would prove perfectly suitable for the purposes of the school, had been approved by the Museum Extension Committee, and adopted by the Town Council. It was feared, however, that the available funds were not sufficient to carry out the buildings in a satisfactory manner. The total number of students who attended the school last year was 260; this year there have been 274. Last year, 1,094 works executed by the students were sent to South Kensington for examination; this year 904 were submitted. Last year was the second occasion on which the school obtained a national award called a "Queen's Prize of Books." This year it has not only obtained a Queen's prize, but also a "silver medal." This is the highest prize yet awarded to the school, and, excepting only ten "gold medals," is the highest prize given by the department. In the local "time examinations" of the students held in the Masonic Hall, 60 students presented themselves last year and 72 this year. 18 exercises obtained the mark "excellent," and 49 the mark "pass," last year; while 21 were marked "excellent" and 52 "pass" this year.

SOUTH KENSINGTON.—The annual distribution of prizes awarded to the students of the South Kensington School of Art, in connection with the Science and Art Department of the Committee of Council on Education, took place in the Lecture Theatre of South Kensington Museum last week, the Duke of Richmond, K.G., Lord President of the Council, in the chair. The prizes awarded consisted of gold, silver, and bronze medals, and Queen's prizes consisting of books, the total number being over 100, and they were won by the students of the school in the local and national competitions of 1874, the number of national prizes being 15. The total number of students during the year has been 728—viz., 390 males and 338 females. One of the prize-takers was Sapper L. Bodle, of the Royal Engineers, for plan-drawing from measurement. At the conclusion

of the distribution, Mr. Redgrave, R.A., addressed those present, and remarked that one of the greatest mistakes into which students generally fell was that of mechanical stiffening. It was to an ancestor of the noble Chairman that was due the creation of such schools as that of South Kensington, for in 1754 he brought some works of art from Italy, and invited any students to attend at his residence in Whitehall-gardens, and there improve themselves in the study of art. The Duke of Richmond said it was gratifying to observe the very great increase in the number of these schools throughout the country, the vast increase in the students, and also the increase in the works of art which are now produced throughout the whole country. In 1871 there were 2,100 art schools in the country; in 1873 there were 2,811. In 1871 there were 203,468 students; in 1873 there were 281,400. In 1871 there were 102,467 works of art sent for competition, and in 1873 there were 157,638. This, of course, alludes to the various art schools throughout the country, and shows a gradual but steady increase in the appreciation of the advantages which studies of this kind confer.

YORK.—On Tuesday evening, the annual meeting of the York School of Art was held under the presidency of the Lord Mayor. The annual report stated that the school had improved in efficiency during the year. The number of students had been 165, an increase of 14. The number of prizes awarded was also larger than last year. The financial condition of the school was in a more favourable condition than it had been for some years past. The committee lamented the death of Mr. J. B. Atkinson, architect, York, who had for many years acted as one of the secretaries of the school.

#### BOOKS RECEIVED.

*Hints on House Building*, by J. R. GUMMOW (Wrexham: Hughes and Phennah), is an attempt, and a fairly successful one, to supply a want felt by many about to build. The author, who is himself an architect, and who appends to his work some very creditable illustrations of domestic buildings carried out under his superintendence, has endeavoured so to place his professional experience at the service of any one about to build as to enable him to form an exact idea of the cost of his project, and to follow its execution with an intelligent interest. Mr. Gummow, first very sensibly cautioning any reader of his book against attempting to be his own architect, points out how easily a sufficient knowledge of planning and details of construction may be obtained to enable a client really to make known his wishes to an architect. He then offers advice in the methods of carrying out the work, followed by a capital chapter on the sanitary aspects of house building, and afterwards occupies the reader with the more technical parts of his subject, dealing successively with foundations, materials, stone, bricks, mortar, cement, timber, carpentry, joinery, &c., &c. Very simple directions for measuring up work are added at the end of each chapter, by which an owner may easily check the parties who are executing the work. A chapter is added on the purchase of land and houses, and a form of Building Agreement given. The illustrations are above the average of those which usually accompany books of the kind, and plans are given as well as perspectives of each building. —*The Draughtsman's Handbook of Plan and Map Drawing*, by GEO. C. ANDRE, C.E., M.S.E. (London: E and F. N. Spon), is likely to be of little use to architectural draughtsmen. To the mere copyist of plans and maps it may prove of more service, but it is not by any means a reliable book. —*The Church Builder for 1874* (London: Rivingtons) is, as usual, a good epitome of the work of Church Extension in England and Wales. —*The British Almanac and Companion for 1875* (London: Stationers' Co.) in due course succeeds its predecessors. The author of the article "Architecture and Public Improvements" in the "Companion," is more hopeful than usual. With nothing but condemnation for Gothic styles, and but qualified praise for "Late English Renaissance," as he calls the "Queen Anne" style, he thinks "the day cannot be distant when the Mediævalist will so adapt and conform his style to the requirements of the age and the purpose and place of the work in hand, as to produce what shall be original, and not merely imitative—a true thing, and not a mockery." —*Blackwood's Shilling Scribbling Diary* is a cheap and efficient



office companion.—*The Best Mining Machinery* (Falmouth: F. H. Earle) is an Essay, by RALPH GOLDSWORTHY, reprinted, with alterations and additions, from the Royal Cornwall Polytechnic Society's Annual Report for 1873.

## Building Intelligence.

### CHURCHES AND CHAPELS.

**BROMLEY-BY-BOW.**—The parish-church of Bromley-by-Bow, which has just been reopened, was originally built in the tenth century, and, with the exception of one small fragment of the wall at the north-east angle of the nave, was reconstructed in 1843 by Mr. Railton. The style then adopted was Norman. Till recently, the plan of the church consisted of nave, south aisle, tower at the south-west angle of the nave, apsidal chancel, and vestries. In the aisle and at the west end were galleries, in the latter of which the organ was placed. The church having been found to afford insufficient accommodation for a constantly increasing congregation, it was last May resolved to enlarge it. This was effected by adding a new north aisle; the arches and columns separating it from the nave were made to correspond with those already existing on the south side of the nave in the new aisle; but the gallery was omitted. By the alterations the accommodation for worshippers has been increased from 700 to 1,000. On the walls of the apse, more especially over the Communion-table, coloured decoration has been introduced. The architect is Mr. Francis T. Dollman. The cost of the enlargement is £2,500.

**CHRIST CHURCH, CHALTON-STREET, ST. PANCRA'S,** has recently been reopened, after having been thoroughly decorated. The whole works were intrusted to Messrs. Pitman and Cuthbertson, of Newgate-street, under the direction of Mr. Billing, (of the firm of Newman and Billing, architects). On entering, the general effect is simple, yet pleasing, the roof of the chancel is ornamented with a vertical pattern, the colours being grey, red, and black, upon a white ground, and with red radiating stars. The stonework of the three east windows is relieved with black, marone, red, and gold. The lower part of the walls is painted white, with a curtain pattern, richly diapered in green, red, and gold. The church has a high-pitched open roof, and the principal timbers are ornamented with a simple yet effective pattern in black, white, and red, the panelling being light blue. The walls of the clerestory, organ-gallery, and aisles, are coloured a warm grey, the windows a firestone colour, lightly ornamented with foliage springing from the arches and the base of the window margins, a light pattern of scroll work running along the top of the side walls in marone and blue upon a vellum-coloured ground, blocked with a blue and gold quatrefoil over each window. The columns supporting the arches in the nave and the galleries are painted very elegantly, and slightly ornamented in gold upon stone colour, marone, and blue groundwork, the gallery fronts oak, and coloured chamfers.

**COLLYHURST, MANCHESTER.**—On the 1st of October a new Wesleyan Chapel was opened for divine service, in Rochdale-road, in the midst of a densely populated district. Sittings are provided for 1,050 persons, all the pews and other interior woodwork being of pitch-pine. Behind the chapel are a band-room and a preacher's vestry, w.c., and lavatory, while on the basement are a large schoolroom, three classrooms, and heating-chamber, with offices for boys and girls. The site is at the junction of two roads, meeting at a very acute angle; and at one side of the chapel the ground is 19ft. lower than at the other. Abundant light and convenient access to the school have thus been practicable. The total cost, exclusive of site, has been £4,500. The style is Italian, the walls being faced with pressed red bricks, with stone and moulded brick dressings. Mr. R. Whittell, of Barnes Green, was the builder; Messrs. Haden supplied the warming-apparatus; and Mr. J. King James, of Hull, was the architect.

**HANDSWORTH, SHEFFIELD.**—On the 12th Nov. the foundation-stone of a Wesleyan chapel was laid by Thos. Cole, Esq., of Sheffield. The chapel will seat 350 people, including 120 in the end gallery, underneath which are two vestries.

Under the chapel is a lofty schoolroom, large enough for 200 children. The walls are built and faced with local stone, in uneven courses. The style of the building is Romanesque, simply treated; the interior woodwork is pitch-pine; the roof is opened timbered. As the site is very narrow, light cannot be introduced from the sides of the building. The total cost will be about £1,500. The builder is Mr. Joseph Buxton, of Handsworth, and Mr. J. King James, of Hull, is the architect.

**HULL.**—This old Wesleyan chapel, Scott-street, Hull, is undergoing restoration, at the hands of Mr. J. King James, of Hull, architect. Both floors and galleries are being seated in pitch-pine, an organ-chamber, with minister's vestry under it, is being constructed; a new warming-apparatus is being inserted by Mr. R. R. Gibbs, of Liverpool; sunlights are being inserted in the ceiling; and a new pulpit and communion are being arranged. The ground-floor of the chapel is being extended as far back as the gallery now reaches. There is also to be a new organ, to cost £400.

**KELMARSH CHURCH, NORTHAMPTON.**—This church has been lately restored and partly rebuilt at the sole expense of Richard C. Naylor, Esq., of Kelmarsh Hall. The whole of the south windows of the nave, as well as the east window of the chancel, which previously were in what is usually called Churchwardens' Gothic, have been replaced by new windows in Ketton stone of fourteenth-century character. The arches and piers dividing the nave from the north aisle have been also renewed. The piers are of polished red Aberdeen granite, with richly foliated capitals in Ketton stone. A new oak hammer-beam roof, with foliated corbels and shafts of polished red granite, with stone foliated capitals, has been put to the nave, the hammer beams being carved into angels holding shields containing emblems, &c. An oak carved and richly-pannelled roof has also been added to the chancel. The roofs are covered with Colley Weston stone slate. The whole of the seating, which is open, with stall at the west end, are new, and are, as well as the pulpit and reading-desk, of elaborately-carved walnut with some admixture of oak. The carving is all conventionalised from nature, and specially designed by the architect, Mr. James K. Colling, and consists of adaptations from the maple, hawthorn, oak, hazel, vine, wheat, trefoil, cinquefoil, and many others, with an admixture of birds, insects, and animals, all carved with the greatest delicacy and artistic feeling. The chancel has been fitted up in the most elaborate manner, with a very rich reredos below the east window, beautifully carved in Caen stone, with polished red granite shafts. The panels are inlaid with antique marbles, which were brought by Mr. Naylor from Rome, and the sacred emblems executed in glass mosaic, the centre panel having an elaborate raised cross carved in statuary marble and inlaid with glass mosaic. The east wall on either side of the reredos is inlaid with marbles and alabaster, with jewelled and inlaid crosses in antique marble. The sides of the chancel have arcades below the eills of the windows, with red granite and serpentine shafts alternately, carrying out the same character of design as the east wall, having inlaid antique marbles in the arches, with carved spandrels containing the emblems of the Passion. The upper portions of the walls have borders of marble and mosaic work, forming panels between the windows filled in with figures, St. Denis, the patron saint of the church, and the four Evangelists. On the east wall, on each side of the east window, is a panel surrounded by an antique marble border—one containing the figure of St. Peter, and the other that of St. Paul. The whole of the figures, which have gold grounds, are executed in Powell's glass mosaic. The floor of the chancel is laid in terra-cotta mosaic, in different colours, manufactured by Mr. Blashfield, of Stamford, with margins of Hopton Wood stone. The altar-rail is of polished alabaster, with jewels and shafts of marble and serpentine. The altar-table is of ebonised wood, inlaid with antique marble jewels and shafts to the columns. The east end of the north aisle is separated from the chancel and western portion of aisle by oak-carved screens, and here will be placed the organ, which is now being made by Messrs. Bevington. The whole of the work, with the exceptions mentioned, has been carried out in a highly satisfactory manner by Mr. Robinson Cornish, builder, of North Walsham, Norfolk, under the superintendence of the architect, Mr. James K. Colling, of London. Mr. John Underwood, of Camden

Town, executed the altar rail and the principal portion of the inlaid marble work. The side windows of the chancel have been filled with stained glass by Mr. W. M. Pepper, of the Euston-road; and the east window with stained glass, at the cost of the rector, the Rev. R. Dalton, by Messrs. Lavers, Barraud, and Westlake, of Endell-street, the subject of which is the Te Deum.

**LEICESTER.**—A new Wesleyan chapel was opened at Leicester on Thursday week. The edifice is in the Italian style, 63ft. by 45ft., and 30ft. in height. A gallery goes round three sides, while at the end a rostrum is erected in place of a pulpit. The ceiling is panelled, and has an ornamental pierced margin, acting as a ventilator. The chapel will accommodate about 800 persons. Underneath is a large schoolroom, 50ft. by 41ft., and 13ft. in height, with seven classrooms and vestry, averaging 12ft. square. The schools will afford accommodation to about 400 children. The total cost of the building, including land, will be about £3,800. Mr. J. R. Ratcliffe was the builder.

**MANNINGHAM.**—A new church, in the Gothic style, is being erected in Grosvenor-road, Manningham, from the designs of Messrs. Walford and Pollard, architects, Bradford. The church is of large proportions, and consists of nave, side aisles, chancel, baptistery, and narthex. The architects have used inside wallstones for the exterior of the building. The church is expected to be ready for opening early in the new year.

**MITFORD.**—The parish-church of Mitford, Northumberland, has for some time past been undergoing renovation and extension. This church is very ancient, and though it appears to have been built in the Early English and Norman styles, it bears marks of having been originally a pure Norman example. Its construction involves an entire pulling down and rebuilding of the church; while its extension will consist in the reopening of a long-closed aisle on the south side, and a lengthening of the nave by the erection of a tower and spire 130ft. in height, work which will entail a cost of £5,000 at least. Mr. Johnson, of Newcastle, is the architect; and the stonework is being executed by Waterson Brothers, of Morpeth. The *Newcastle Daily Chronicle* is of opinion that the extension of the building is not needed, the entire population of the village being only 300, and that the laying of foundations for the new tower has caused a most unseemly interference with the churchyard. Coffins are struck into with pick and spade by the workmen in the most matter-of-fact manner. Broken skulls and fractured tibæ lie scattered here and there, and in this dreary winter weather the place is unutterably ghastly.

### BUILDINGS.

**GLASGOW.**—A new public hall is being erected at Glasgow. The building consists of two floors and an *entresol*. The great hall of the building forms the east side of the entire block, and, independent of the north gallery, is 168ft. long, 75ft. wide, and 56ft. high. The hall contains 15,565 superficial feet of floorage, and will seat with comfort an audience of 2,926 persons. On the upper floor are two extensive halls, each 70ft. by 54ft., with ceilings proportionately high, and having a complete suite of arrival and retiring rooms attached. Mr. Campbell Douglass is carrying out the work of erecting these extensive halls. It is estimated that the total cost will be £62,500.

### CHIPS.

The District Surveyorship for Paddington has been rendered vacant by the death of Mr. G. Gutch. The election will take place this day (Friday) at 12 noon.

The Val de Traverses Asphalte Paving Company, Limited, have received instructions to lay the courtyards and gateways of the New National Gallery with their compressed Asphalte.

The delay in converting a portion of Tooting-common into a public park and recreation ground is now at an end, and the ground will be excavated and laid out in an ornamental style, and opened to the public early in the spring.

A new fort is about to be constructed near the large one known as "Garrison Point Fort," Sheerness. The War Department has accepted the tender of Messrs. Lee and Son for its construction, and it is to be commenced immediately. The estimated cost is over £17,000. The fort is to be completed by the end of 1876.



## TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions to our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

TO OUR READERS.—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

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Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

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MATTHEW REED, jun. (Drawing to hand).—E. M. FORSTER (Drawing to hand).—B. (Drawing to hand).—S. MAR-GROVE (Five lithos to hand).—E. W. PUGIN (Drawing to hand).

## Correspondence.

## A SCIENTIFIC AND SAFE WATER-CLOSET.

(To the Editor of the BUILDING NEWS.)

SIR,—There is an old saying that “an ounce of practice is worth a pound of theory,” and it appears to me to be verified in Mr. Duffield’s letter, at p. 682. He objects to me referring to the occasional use of the gas, and is afraid of a blow-down. He forgets that at night and in the winter time the gas is often lighted, independently of there being any ventilator, so I merely “kill two birds with one stone.”

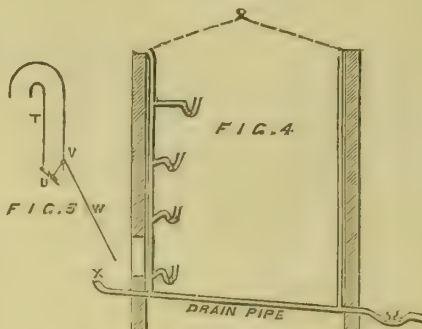
If he is afraid of a “blow-down,” he may, owing to the window, just as well be afraid of a “blow-in.” There was about a year ago a disagreeable smell from the using of the water-closet complained of in a warehouse I worked for. They had a fixed window just behind the water-closet seat. They wished me to make an opening for the admission of fresh air there. I objected, stating that if that were done there it would, owing to the situation of the w.c., make things worse, as the draught coming in would carry the bad smell more quickly into the warehouse. That was admitted, and I was allowed to put in a 3in. zinc ventilating-pipe, with a tinned iron mouth-piece, as shown at page 651. Since then the complaints of bad smell stopped, the fresh air coming in at the doors, &c., of the warehouse blowing the foul air up the pipe, and in this case without gas.

Several times I have applied the flame of a candle to the lower opening of the pipe, and the way it was drawn up showed a good up-going current existed. The length of the perpendicular pipe in this case was fully 40ft. The practical working of this ventilating-pipe, therefore, answers Mr. Duffield’s first question, and explains why,

even although there be a window in the water-closet, I yet approve of a ventilating-pipe being put in. Mr. Duffield is afraid of cold draughts from the 3in. pipe; well he may help that by putting in a smaller pipe, say a 2in. one. He may also prevent it by putting on a small Boyle’s patent air-pump ventilator on the top of the pipe on the outside; or he may put on a simple valve in the inside, which he can open and close, or regulate as he pleases.

This latter plan worked so well in an artist’s studio, that it had to be put into his bedroom also. Not, of course, directly above the head of the bed.

Fig. 3 is a sectional view, showing how the valve



worked. T is the zinc ventilating-pipe. U is the valve, a little below the ceiling, attached by means of a small brass hinge to one side of the ventilating-pipe. V is a small brass pulley, over which the cord W works. The valve U is made of sheet zinc, loaded with a piece of sheet lead, and has a piece of red flannel, or of sheet indiarubber, upon its upper face, so as to shut more tightly when drawn up.

As to the ventilating-pipe H, as I have shown it, “not being a new idea,” I have substantial reasons for observing that I am not quite so sure of that, at least to many minds. It has, indeed, been put in with its one end attached to the water-closet trunk, but in place of carrying out the other end to the fresh air *per se*, as shown at page 651 (and also at page 198 of the BUILDING NEWS for September 13th, 1872), it appears to be a not uncommon, though very bad, practice with some to lead it into the ventilating-pipe of the soil-pipe! This was possibly the cause of the late illness of H.R.H. the Prince of Wales, and also of the death of several noblemen, &c., from typhoid fever, as explained at page 392 of the BUILDING NEWS for May 17th, 1872. I do not understand what Mr. Duffield means when he says, “should your engraving be a correct copy of the sketch.” If he means to insinuate that you, Mr. Editor, or some one in your office, either assisted me in, or altered in any way the sketch I sent up, he is mistaken. I have known of the use of the air-pipe H for the last eighteen years, and have put it into various water-closets years ago, as well as quite recently. As to Mr. Duffield’s theoretical objections to the soil-pipe D debouching into the syphon-trap C, as shown at p. 651, November 27th, these in practice can be easily set aside, and it is such impractical observations that lend a handle to such *Quarterly Review* critics as those mentioned at p. 501 of the BUILDING NEWS for October 23rd last, and give them an excuse for attacking “architects and artists” while praising up “master-masons, carpenters, and smiths.” Mr. Duffield states that “the stench from the open grate C would be continuous, especially in a large house where closets from three flats all went into the one soil-pipe D.” Now that is purely imaginary, for instead of any “stench” that might be in the pipe D “continuously coming out at C,” the pressure of the atmosphere upon the mouth of C would cause it to come out through the ventilating pipe of the soil-pipe F. (At p. 651 F in the sketch is shown as going through the wall, but in the text, at the foot of the same page, it is stated that if considered more suitable or advisable, it may be carried up to the roof.) Seeing, however, that the soil-pipe D is perpendicular, and the pressure of the atmosphere upon the surface of C continuous, it follows that any particular collection of bad air in the soil-pipe D is prevented. Besides, seeing that the syphon-trap at C to a great extent practically cuts off the bad air from the drains, very little foul air will exist in the soil-pipe D. In putting in the syphon-trap at C it is right, however, to keep it as far back from any doors or windows as conveniently can be done.

A good-sized soil-pipe helps matters—not less than 4½in. in diameter internally, and if 5in. all the better. As supporting me in stating that Mr. Duffield’s fears about Care are imaginary, I may, e.g., allude to one gentleman’s house that I have worked for ten years past. It is four stories high, and has four water-closets, one on each flat, all of which go into the one soil-pipe, as shown in sketch Fig. 4. The rainwater-pipe from the back gutter of roof drops down into the top of the soil-pipe, and serves as its ventilating-pipe. There will be about 14 persons in the house, ages from say two years to forty. There is an open grating x in the asphalted back-yard; this grating is about 5ft. out from the back door, and straight before it. Said back door is often open, and persons often pass out and in, yet I do not remember smells from this grating being complained of for long past, although if such had been, the grating could have been easily removed farther back. I was there a few days ago, and put my nose close to the grating, but could feel no smell, the reason being that any smell that was in the drain or soil-pipe was being blown up the soil-pipe and out at the roof, owing to the pressure of the atmosphere upon the surface of x Fig. 4. As to Mr. Duffield’s last objection that “should the drains be choked at any time, the sewerage and soil would be forced up the grating into the yard,” I simply say—the best place for it to be forced up. Far better for it to be forced up in the area or yard outside, than up some of the pipes, &c., inside. I am, sir, &c. W. P. BUCHAN.

27, Renfrew-street, Glasgow.

## SEWER GASES AND WATER-CLOSETS.

SIR,—With reference to this very important question, I would beg to call attention to one or two points.

In using a pan closet it is desirable to draw the handle at least twice; the first time the soil is deposited in the receiver, and by the second operation it is carried into the drain, and the trap is charged with nearly clean water, thus reducing the chance of air pollution from that source to a minimum. A separate cistern is always desirable for water-closet service, and this brings the suggestion whether it would not be possible to place in this cistern a slowly soluble disinfectant, so that all the water passed through the water-closets should of itself carry the antidote to the poison. The chemical agent need not be powerful, as, if the drainage is anything like effective, the excreta are rapidly removed to a distance. It should be solid, slowly soluble, nearly inodorous, and of sufficient size not to require too frequent replacement.

The prevention of noxious exhalations in the sewers seems to be better than the cure, and easier to manipulate than any proposed removal that has hitherto been suggested. The very construction of the sewers, the numerous inlets and outlets, would appear to render any general system of ventilation impracticable.

The pressure of air in the sewers varies with every change in temperature and pressure in the atmosphere, and during high winds it would be almost as difficult to prevent the air being driven into the house through the sewers as through the windows. All flap-traps rapidly corrode, their seats get fouled, and they soon cease to be really effective; the idea of tempting the air from the sewers up small gas pipes, in which the friction alone would almost overcome the rarefying power, seems almost visionary, and even if it could be actively employed, would produce no perceptible difference in the sewers. I therefore submit that the probable direction in which scientific inquiry might be best employed would be towards providing an agent which should either neutralise the noxious gases, or retain them in solution until the soil is removed sufficiently distant to be devoid of mischief.—I am, Sir, &c.,

THOS. CHAS. SORBY.

## KING’S COLLEGE, LONDON.

SIR,—You have permitted me, on some occasions, to direct attention to the manner in which additions or alterations to our public buildings have been executed by architects not the architects of the structures referred to. It is, I think, generally admitted by men qualified to give the opinion, that when an architect is called upon to add to or make alterations in an existing structure he should, as far as possible, conform to the character of the design he has to deal with, and



not introduce quaintnesses or individuality which he practises in unfettered works. Mr. McVicar Anderson, the other evening, at the Institute, alluded to this with reference to his addition at Orwell Park, and said that even where indifferent design existed it was desirable to follow the original work; in which opinion probably most architects will agree.

The entrance gateway to King's College was, I believe, designed by Sir Robert Smirke, and is of stone. Recently an addition has been made by the introduction over it of what may be termed a dormer. This is of wood, and alone at once determines the incongruity, without reference to the danger from fire. This Dormer overhangs considerably the face of the gateway, and is superposed on a broad, ugly string of cement work in five ugly panels, and the wide soffit, which is very visible to passers-by, remains in unadorned loveliness. The straight line of this string cuts the top of the semicircular arch, and, with the introduction of two lights under, completes an addition to a Classic structure which, for ugliness and apparent ignorance on the part of the architect, it would be difficult to exceed in London. I do not know, nor care, who is responsible for this work, but it deserves to be looked at as to the extent to which disregard for an existing structure may be carried.—I am, Sir, &c.,

WM. WOODWARD.

## Intercommunication.

### QUESTIONS.

[3589.]—The Art of Painting on China.—Would you kindly inform me, through the columns of your paper, if any works are published on the above subject, and where they may be obtained?—W. F. D.

[3590.]—Rain-water Tank.—What is the best method of constructing a rain-water collecting and filtering tank for a country house? I suppose it is advisable to ventilate it? What arrangements are best for periodical thorough cleansings?—R.

[3591.]—Cement Bricks.—I want to make bricks of cement and sand by pressure. What is the simplest, cheapest, and best mode of mixing and damping or moistening the material and feeding the press with it? I am advised to use scintic cement (say, 7 of sand to 1 of cement). How will this do?—A. Z.

[3592.]—Heating.—A small room adjoins a hall, with a stove in it. How may the heat from said stove be best made to warm the room?—ECONOMIST.

[3593.]—Tiling.—Can some practical reader give me the number of plain tiles there are to a square, and the quantity of laths, and nails, and mortar required?—BUILDER.

[3594.]—Cube Brickwork.—What is the simplest method of reducing cube brickwork to superficial feet of standard thickness? Will some reader enlighten me?—STUDENT.

[3595.]—Magnesian Limestones.—Will some one tell me the components and chief qualities of these?—W. H.

[3596.]—Chilmark Stone, Wilts.—I should feel obliged if some reader would tell me what is the crushing strength and weight of Chilmark stone. It is a limestone, I believe. What is the average crushing strength of limestones?—PETRUS.

[3597.]—Hydraulic Cements.—What proportions of chalk and blue alluvial clay will make a good water cement?—W. H.

[3598.]—Mortar.—Dr. B. Higgins, in his well-known work on "Limes and Cements," says, one of lime to six of sand make the best mortar. How is it bricklayers use only half that quantity of sand, and architects adopt the same proportion, or three to one?—FOGGED.

### REPLIES.

[3580.]—Hydraulics.—I am really astonished to see "G. H. G." persisting in asserting that, although there be 6 ft. of pressure, the water in a  $\frac{1}{2}$  in. pipe only 64 ft. long would refuse to flow through it on account of the "friction." Why, with a head of 6 ft., a plentiful supply at the inlet, and the  $\frac{1}{2}$  in. pipe put in in the style shown by Fig. 2 (p. 566), the water would flow freely (especially if the interior of the pipe were smooth), though slowly, into the lower cistern, supposing the distance were 1,000 ft., let alone but 64 ft. Further—where speed is no object—so little value do I put upon "friction" in a pipe but 64 ft. long, that I will take a small lead pipe of only  $\frac{1}{2}$  in. bore (practically, considerably less than one-ninth the size of "G. H. G.'s"  $\frac{1}{2}$  in. pipe) and 64 ft. long, and, discharging with "6 ft. of pressure," I will place two 1 ft. deep cisterns 60 ft. apart upon the same level, and, filling the one cistern, I will guarantee that the water from it will soon flow through the 64 ft. of  $\frac{1}{2}$  in. pipe and fill the other cistern also. The experiment I

made a fortnight ago with the  $\frac{1}{2}$  in. pipe—not to mention any practical experience otherwise—clearly establishes that, I consider.—W. P. BUCHAN.

[3563.]—Ancient Lights.—The rebuilding of the wall will not annul the claim; but I should advise taking a correct survey with drawings of their position and size, with all dimensions figured on the drawings, as a reference in case of doubt. I have none. It is decidedly not advisable to alter either the size or position of any lights; you have no right to do so. You may do so, but you must abide the consequences. I have done all the former, and always advise not to do the latter—not being lawful nor expedient.—M. G.

[3571.]—Firebrick Backs to Stoves.—I am obliged to W. E. Mills for his answer. Will he kindly tell me what angles the sloped back and sides of grate should have to promote radiation? Since writing I find the grates of Messrs. Shillito and Shortland are advertised and fully described in the BUILDING NEWS, as well as some others of similar principles. It appears to me the grate in question is an admirable adaptation of correct principles, and what a fuel-economiser should be. As an architect, my object has been to obtain definite information on the subject.—AN ARCHITECT.

[3575.]—Free Trade Hall, Manchester.—An illustration of this building is given in Mr. T. Roger Smith's book on Acoustics (one of Weale's Rudimentary series), price 1s. 6d.—H.

[3576.]—Public Halls.—I think a hall 100 ft. by 60 ft. would do, or a proportion of two to one or a double rectangle would do. A height of 30 ft. would probably be best for the former proportion, though rather higher would be better for appearance. This is a point that must depend on the construction and shape of the roof; a flat or slightly curved ceiling would be best for sound.—CLERK OF WORKS.

[3576.]—Public Halls.—Mr. W. Gurley Smith asks a question which, if exhaustively answered, would require as much space as a three-volume novel. The best proportions of a public hall are dependent on a variety of questions: Whether it is to be used for speaking or singing? The position of the platform? Shape of ceiling? Gallery or no gallery? Materials in construction, &c. But taking a plain hall, with provision for an ordinary gallery as a guide, my experience leads me to believe that  $1\frac{1}{2}$ —2—3, may be taken as a tolerably safe guide, admitting of side and end galleries. Thus the hall that Mr. W. Gurley Smith has in his mind's eye would be 40 ft. high to ceiling, 60 ft. wide, 90 ft. long, 30 being taken as a multiple. But I would recommend Mr. Smith, and such as him, to read Mr. T. Roger Smith's book on Acoustics.—H.

[3579.]—Deductions.—If I understand the question rightly, the contractor was paid for the piping actually used. This is all he can ask for.—CLERK OF WORKS.

[3580.]—Contingencies.—I do not see that the employer can claim any credit for the sum set apart for contingencies. The risks, such as they were, or supposed to be, were taken by the contractor for a certain sum, and it appears only right and fair that he should take any surplus allowed for such risks. I think also legally he would be entitled to it.—G. H. G.

[3580.]—Contingencies.—The contingencies included in my old friend "F.'s" contract is clearly the property of the proprietor. All risks of the builder are supposed to be covered by his price for well defined work, and I am not alone in the profession in including in every contract a sum for contingencies, so as to avoid, as far as possible, the irritability which is a natural consequence of that ghastly word "extras." When a builder has nerve enough to claim "extras" and the contingency too, he might just as well claim all the world for his own.—H.

[3581.]—Speaking-Tubes.—I introduced speaking tubes freely into my own house, believing they would save much trouble to self and servants, as supplemental to bells. They have not been used for years, having by mutual and tacit consent of all parties concerned been voted a bore.—J. P. S.—[Speaking-tubes have been introduced into the BUILDING NEWS Office, and have not been voted a bore.—ED. B. N.]

[3582.]—Hydraulics.—In replying to "Live and Learn," I must first observe that at page 653 I did not speak of "increased flow" as being the result of the contraction of the aperture. Instead of the quantity of water emitted being greater when the water spouted up 3 ft. or 4 ft. high out of the  $\frac{1}{2}$  in. orifice, I would expect it to be greatest when coming out of the  $\frac{1}{2}$  in. pipe, full bore, though only spouting up about 3 in. Perhaps, however, what "Live and Learn" wants is an explanation of how or why the simple contraction of the orifice caused the water to rise so much higher. Well, a pipe of  $\frac{1}{2}$  in. bore is but one-ninth the size of a  $\frac{1}{2}$  in. pipe—a  $\frac{1}{2}$  in. being the same of a  $\frac{1}{2}$  in.—consequently the larger pipe can run off nine-tenths as much as the smaller one. With this large margin of eight-ninths of overplus, the larger pipe, though 64 ft. long, is, I may almost say, virtually transformed into a cistern. In the case of the pipe we are speaking of, therefore, with its 6 ft. of pressure, we find the water will, when the orifice is contracted as above stated, spout up into the air about 4 ft. high. Attraction of gravitation and the resistance or pressure of the atmosphere prevent the spouted water from rising to quite the same height as the surface of the water in the fountain-head or cistern. Any street fireplug is a good example of what we are speaking of.—W. P. BUCHAN.

[3583.]—Best Framing for Church Roof.—Open timber roofs need better scantlings and richer work than usually afforded them. Ceiled barrel roofs give best opportunities for ventilation, agreeable temperature, and decoration. With modern low walls, ties at the springing line of roofs are an offence to the unarchitectural mind. Roofs with principals are preferable in Memel timber to those in which all couples are alike. The principals, however, must have ties, or be made rigid without. The ties may be raised mid height, if made secure with iron bolts and nuts in the direction of the tie, or can be dispensed with if curved ribs in the angles breaking joint be bolted to principals and the ceiling cradling is efficiently constructed.—J. P. S.

[3583.]—Roof.—A cross-braced roof, the cross braces being securely tied to the feet of principals, and, the intersection of the braces sustained by a king-rod or post, would be the most effective and economical roof. Collar roofs are generally defective in spans so great as 20 ft. If collars are used they should be well strengthened at the angles by short braces, or ribs, so that the strain at the junction with the rafters may not tend to bend the latter; or else the lower ends of rafters should be assisted by struts, or curved pieces springing from the wall some distance below the plates, so that the strain may be thrown upon the walls more vertically. A collar roof in which the collar is considerably above the plate level, and with no struts below to assist the rafters, exerts an injurious thrust upon the walls, every settlement, jar, or vibration, tending by the weight of the roof to wedge asunder the supporting walls.—G. H. G.

[3585.]—Ventilation.—It is considered that every adult vitates from 15 to 20 cubic feet of air per minute. For ordinary sitting-rooms from 300 to 500 ft. should be allowed every person. Dormitories should have 800 to 1,000 at least.—G. H. G.

[3588.]—Ventilation of Weaving-shed.—Perforated openings placed along the upper angles of the roof near the top of the lights, and leading into a tube running lengthwise, and having one end terminated with an outlet and cowl, would be sufficient to extract all the close and vitiated air of the shed.—ARCHITECT.

### LEGAL INTELLIGENCE.

ACTION BY AN IRISH BUILDER.—George W. Ford v. Thomas Bennett and others.—This was an action tried on Tuesday in the Dublin Court of Exchequer to recover certain sums of money alleged to be due for extra works alleged to have been executed by the plaintiff, who is a builder in Cork, from the trustees of the Wesleyan Methodist Chapel at Kinsale. It appeared that in the month of May, 1873, the plaintiff entered into a contract with the defendants to erect a new chapel in that town, and in the course of the building certain extra works were done by him, on foot of which he now sought to recover compensation. The jury found for the plaintiff—£150 damages, with a respite of execution to first day of next term.

CHARING CROSS IMPROVEMENTS.—A compensation jury, presided over by Mr. Farrer, the high bailiff of Westminster, was engaged on Wednesday week, at the Session House, Broad Sanctuary, Westminster, to assess the sum to be awarded by the Metropolitan Board of Works to Mr. Bax, dealer in waterproof materials, for his premises at Charing Cross, which were required for the improvements now being made. The claim was upwards of £10,000. The surveyors for the claimant were Mr. Green, Mr. Pritchard, and Mr. Hudson; and for the Metropolitan Board, Mr. Driver, Mr. Rushworth, Mr. Wimble, and Mr. Chadwick. A large claim was made for the loss occasioned by the removal to the new premises, as well as for the leasehold property. Counsel having addressed the Court, the high bailiff summed up, requesting the jury to decide the verdict as to the leasehold and the business interest. The jury gave a verdict of £1,368 for the leasehold, and £2,636 by loss of removal and fixtures, making £4,002.

PARTY WALLS.—RUTTER v. HARDCASTLE.—This case, tried on Tuesday week, before Lord Coleridge and Justices Keating, Lush, Quain, and Archibald, sitting as a Court of Error in the Exchequer Chamber, was a building case from Sunderland, and was one of the class of cases which are now becoming rather common—in which one of two neighbours builds on the party wall between their houses. In the present case the parties had purchased on building leases two adjoining plots of ground on an intended "Esplanade," on which houses were to be erected according to certain plans, it being expressly provided that the walls (9 in. walls) should be considered party walls, and that the owners of adjoining houses should have liberty to erect their timbers thereon. The deed of conveyance of each plot conveyed by dimension a specific piece of land comprising half the site of the party wall, and the plaintiff's and defendant's deeds thus conveyed half the site of the wall between their houses. The houses were built, but the defendant built his house higher than the other, and in so doing had built upon the party wall, and thus increased its burden, and moreover, so to speak, appropriated the whole of it; that is, had built upon its whole breadth. To this the plaintiff objected, on the ground that as it was a party wall half of it was his, and the defendant had no right to build upon it, and in so doing he had done him damage, which was estimated by an arbitrator at £208. The Court of Exchequer—the Lord Chief



Baron, Baron Martin, and Baron Pollock—decided in favour of the plaintiff, and the defendant appealed from that judgment. The great point argued was as to the nature of the wall in such a case, whether it was to be considered as a party wall, half belonging to each party, or whether it was a wall equally belonging to both as tenants in common, in which view each party would be equally entitled to the whole of the wall, and whichever of them first took possession of it would be entitled to keep it. Lord Coleridge, in giving his judgment, said the plaintiff, who built his house first, had built his outer wall half on his own ground and half on the defendant's, and the defendant, when he came to build his house, built it several feet higher than the plaintiff's, building it on the wall so built up by the plaintiff, partially unroofing the plaintiff's house for the purpose. The deeds of conveyance expressly provided that the walls should be deemed party walls, and that each party should be at liberty to rest his timbers on the wall. The question was whether what had been done by the defendant under these circumstances gave any right of action. Upon the hypothesis of any real and actual injury, arising, for instance, from the weakening of the wall, and the consequent subsidence of the plaintiff's house, the Court did not doubt an action would lie. But the more important question for general purposes was, whether an action could be maintained apart from actual and substantial damages, merely on the ground of an infringement of a legal right. As to this, different considerations might apply to what were called "party walls" under different circumstances. Where the boundary was known there was no presumption of a common property; and here the boundary was known, and so it was impossible to presume a common property in the wall. The term "party wall" in itself had no distinct significance, and meant no more than a dividing wall. But the provision in the deed that the walls should be considered party walls meant more than that they were dividing walls, for it would be idle to provide for that. And the fair inference was that they were to be "considered" as common property. He came, therefore, to the conclusion that the wall was to be considered common property—that is, the parties had in effect agreed that they should be considered common owners of the wall. The result was that no action would lie by one against the other for a reasonable use of it. No doubt modern law would allow an action for unjustifiable injury to the wall. But of such injury in the present case there was no proof; the defendant would have a right to use the wall for the purpose of completing his house. If there had been any actual injury or destruction to the wall, it would, of course, have been otherwise. It was a question of degree, as here there had been no real actual injury, there had been nothing to ground an action. The case in the Queen's Bench in which Mr. Justice Crompton had given the opinion quoted was different from the present in that respect: for there was a plain and actual encroachment upon the plaintiff's property, while here there was not, and the earlier case in the same Court was consistent with the present judgment. In short, his view was that for any real, actual, substantial damage an action would lie, but that in the absence of such damage it would not. So far, therefore, as there was such damage the judgment would be affirmed; so far as it was otherwise, reversed. Mr. Justice Keating concurred, adding that there was no dissent from any of the legal principles laid down by the Court of Exchequer. The other judges concurred. Judgment in effect for the plaintiff to the extent of any real damage.

**ST. MARY'S, WHITECHAPEL.**—Doctor Middleton applied, in the Consistory Court of the Chancellor of the Diocese of London, on the part of the rector and churchwardens of St. Mary's, Whitechapel, for a license or faculty to pull down St. Mary's Church, Whitechapel, and build another on the site. Mr. O. Coope, M.P., had made a liberal offer of £12,500 to build a new church, and the parish gladly availed themselves of the offer, and could by public subscription collect £6,000 more. The Chancellor was satisfied as to the plans and the provision made for the graves. He decreed a faculty to demolish the present and to build a new church.

#### CHIPS.

The memorial-stone of a new Danish Lutheran church, new being built at Newcastle-on-Tyne, was laid on Monday afternoon by Mr. T. Borries. The building is in the Gothic style of the Early English period, Mr. F. R. N. Haswell, North Shields, is the architect. It will accommodate about 185 persons. It is estimated to cost £2,500.

It is proposed to erect a memorial of the late Mr. Tom Hood in Nunhead Cemetery.

Mr. C. T. Newton, keeper of the Greek and Roman Antiquities at the British Museum, has been elected an Hon. Fellow of Worcester College, Oxford.

St. Nicholas-street Unitarian Chapel, Lancaster, was reopened on the 25th Nov., after alterations from plans by Messrs. Paley and Austin, architects. The total cost has been about £1,500.

Mr. Thomas Woolner, A.R.A., has been elected a Royal Academician, in the room of Mr. J. H. Foley, R.A., deceased.

## Our Office Table.

### DEMOLITION OF KENNINGTON MANOR HALL.

—The old Manor Hall of Kennington, in Lower Kennington-lane is about to be pulled down to make room for a new street running from the Kennington-road (alongside St. Philip's Church), to Kennington-lane. The Manor House itself, though not older than the time of James I., stands on the site of an ancient royal palace, which had a history almost as interesting as that of the archiepiscopal palace at Lambeth. Lysons says that the manor of Kennington belonged to the Duchy of Cornwall, and in ancient times had a royal palace, which was the favourite residence of Edward the Black Prince. It was also the occasional residence of Henry IV., VI., and VII., after which the manor was farmed out by Henry VIII. The palace being pulled down, a manor house was built on its site, in which Charles I. resided when Prince of Wales. In the survey of 1656, mention is made of part of the ruins of the palace adjoining the manor house, being a barn 180ft. long, built of flint and stone, and this barn, in 1709, was the receptacle of the distressed Palatine Protestants. It was pulled down in 1795, and on the site arose Park-place, Kennington Cross. In digging the foundations several spacious arched vaults were discovered.

**PUBLIC WORKS OFFICE, DUBLIN.**—An open competitive examination for the appointment of Furniture Clerk in the Irish Public Works Department will be held in Dublin, by the Civil Service Commission, on Monday, the 11th of January next. A preliminary examination will be held on Wednesday, the 6th of January. The limits of age are 25 to 35, and the examination will be in two parts—preliminary and competitive—the preliminary examination being in handwriting, orthography, and elementary arithmetic, and the competitive being in the practical details of the furniture trade, such as the knowledge of furniture and fittings likely to be required for Royal palaces and public buildings, the estimating the cost of supplies and repairs, and the preparation of working drawings and sketches of articles of furniture. A fee of 10s. will be required from each candidate attending the preliminary examination, and a further fee of £1 from each candidate who may be admitted to the competitive part. The salary of Furniture Clerk in the Public Works Office, Dublin, is £200 per annum.

**THE WREXHAM CEMETERY COMPETITION.**—Some time ago the Corporation of Wrexham determined to lay out a new cemetery, and an advertisement was issued inviting architects to send in drawings. The result pretty well proved that it was no competition at all. According to the correspondent of a local paper, "the Mayor had already instructed his architect, and, as he himself said, paid for a design," and this the Town Council adopted. The original amount to which the architect was limited for the erection of the chapels and lodge was £1,500. The successful architect's estimate, as stated to the Council, was £1,365. The tenders which the Council have received for the execution of the works will best speak for themselves:—Mr. W. E. Samuel, £3,348; Mr. Clarke, Denbigh, £3,880; Mr. W. H. Ford, £4,260; Mr. Prigun, Wrexham, £4,629; Messrs. Cordreigh and Stockford, £4,687; Mr. W. Rogers, Rossett, £4,381. There is very little to be said. Another job of the usual description has been perpetrated, and the townspeople of Wrexham, should the scheme be carried out, will have to pay twice the estimated cost for their cemetery, thanks to the double-dealing of the Town Council in the first instance.

**IRON FURNITURE.**—Amongst recent industrial developments in Germany, says a correspondent of the *Practical Magazine*, we have to notice that of hollow iron furniture, the use of which in Austria has been popular for years. In Germany, however, it is only quite lately that the first large factory for making this class of goods has been opened. Ribbon-iron of the best quality is taken and converted into tubing in pieces of about five metres long, which can be bent cold into any form suitable to the making of bedsteads, chairs, tables, &c. Hollow iron is stronger than solid iron, such as that usually employed heretofore, and possesses this special advantage, that the rivets hold better, and that it does not itself break so easily, as is frequently the case in solid iron, which gives way where there is a flaw.

**OPERATIVE STONEMASONS' SOCIETY.**—The second triennial meeting of delegates from this Society has been lately held in London, and on Wednesday week they were entertained at tea at the Artisans' Institute, in St. Martin's-lane, by the principal, when they communicated the following statements concerning their Society. They have 350 lodges in England, Wales, and Ireland, with about 21,000 members; new lodges are continually being formed, and their Society is in a regular communication with a similar Society in Scotland. Since their establishment in 1840 up to 1873 they have spent in payment to members out of work, or disabled by sickness, £109,386; to members suffering from accidents, £23,041; in subscriptions to hospitals, £3,272; for charitable purposes of various kinds in the trade, £515; making with other and similar items, a grand total for benevolent purposes and mutual help, of £145,021. The amount, on the other hand, spent during the period in what is called "trade defence," viz., in supporting members in lock-outs and strikes, is little more than a third of the amount spent for benevolent purposes, viz., £56,896.

**TIMBER OF NATAL.**—The coast lands of Natal are thickly wooded, but it is not here that the timber forests of the colony are found. The larger trees on the coast are too twisted, hollow, or narrow, to be widely available for plank timber, yet they are all useful for certain specific purposes. The ironwood, whose stem is sometimes 18in. wide, affords a very heavy and compact wood, useful for axles and other purposes requiring great strength. There are many other woods found upon the coast, of especial value to the waggon-maker, and which may probably be found valuable hereafter by the boat-builder and the cabinet-maker. In certain localities of the uplands, fine timber-yielding trees are found. The most important are the yellow wood, a variety of yew, sneezewood and stinkwood are both long-fibred tenacious woods, of good service to the cabinet-maker; and there are two species of ironwood extremely close-grained and dark-hued. The one known as African ebony would be of great value in England for church furniture and carving. In addition to these, there are many other descriptions, such as the red and white milkwoods, the red pearwood, of a dull colour, but uniform texture, and the red ivory-wood, a very beautiful wood of a fine rich rose-colour, taking a high polish.

**CHARGES AGAINST A BOROUGH SURVEYOR.**—At a meeting of the Bradford Town Council on Tuesday afternoon, a special committee was appointed to inquire into and report on the manner in which the duties of the borough surveyor and waterworks manager had been discharged, and whether that officer had been engaged in any other occupation or any undertaking incompatible with his duties under the corporation. The chairman of the Street and Drainage Committee, according to the *Liverpool Mercury*, complained in strong language of what he said had been the gross neglect of his duties by Mr. Gott, the borough surveyor and waterworks manager, and said that his attention had been taken up by speculations in property and in the management of a brewery in which he had become a large shareholder. Another resolution, asking that an investigation should be made into certain charges of jobbery that had been brought against members of the council by a local newspaper, was rejected, only one or two members voting in its favour.

**INSTITUTE PAPERS.**—The following papers have been promised for the ordinary general meetings of the session:—"Notes on Ancient and Modern Work in Egypt," made during a recent tour. By Professor T. H. Lewis, Jan. 4th; "On the Restoration of the Lodge at Sheffield Manor." By C. Hadfield, Fellow, Jan. 18; "On Public Abattoirs," with special reference to one recently erected in Manchester. By A. Darbyshire, Fellow, Feb. 1; "On the Temple of Diana at Ephesus." By J. T. Wood, Esq., Feb. 15; "On, certain new or revived Processes in Decorative Art." By G. T. Robinson, Contributing Visitor March 1; "On Iron, as a Constructive Material." By C. H. Driver, Fellow, March 15; "On the Church of St. Francis at Assisi." By J. Beavington Atkinson, Esq., April 5th; "On the decoration of Roman and Byzantine Basilicas." By R. P. Pullan, Fellow, April 19.

**THE ELECTRIC LIGHT FOR LIGHTHOUSES.**—The Trinity Board are about to fit the Lizard



lighthouses with the requisite apparatus for exhibiting the electric light. In experiments recently made near Paris with an electric light, specially adapted for illuminating distant objects, it was found that distances up to 10 miles could be clearly brought out, and by means of telescopes, all the points in the cones of light could be reconnoitred. This was accomplished by a sort of gigantic lantern lens, the charcoal points being placed within the tube supporting the lens. A light of this kind is, of course, not wanted in a lighthouse, but it would be of considerable value in disclosing to those on shore the position and condition of a vessel in distress.

**ARCHITECTURAL ASSOCIATION.**—At the ordinary general meeting of this Association, held on Friday evening last, Mr. George H. Birch, President, in the chair, the following gentlemen were elected Members, viz.: Messrs. Robert Healing, J. M. Kennard, Henry W. Beale, T. W. Barker, A. Stanton Cook, J. Edmond Drower, Evan R. Down, Alfred Tween, C. F. Henson, H. Herbert Francis, and Edward W. Coldwell. Some very beautiful sketches were exhibited by Mr. G. D. Oliver, these drawings having been submitted in competition for the prize given by the Association last session for the encouragement of architectural sketching. It was announced that Mr. Sharpe's lecture on the Annual Excursion, which will be given on Friday next, the 18th inst., will not be given at the rooms of the Association, but at Willis's Rooms, King-street, St. James's. This is owing to the large number of drawing and diagrams, which will cover from 1,000 to 1,500 superficial feet. Mr. A. Payne, A.R.I.B.A., then read a paper on "Periods of Transition in Architectural Style; and is the Present Day One?" A discussion followed, in which Messrs. Quilter, Sulman, Marnock, J. D. Mathews, R. Phené Spiers, Aston Webb, and S. F. Clarkson took part.

## CHUBB'S STRONG ROOMS,

Iron Doors and Safes;  
IRON LININGS, SURVIVING, AND OTHER FITTINGS  
Of the best Manufacture.  
CHUBB'S PATENT LOCKS,  
CHUBB AND SON,  
Makers to the Bank of England,  
57, St. Paul's Church-yard, E.C.  
And 64, St. James's street, S.W.—[ADVT.] } London.

### MEETINGS FOR THE ENSUING WEEK.

**MONDAY.**—ROYAL INSTITUTE OF BRITISH ARCHITECTS.—"The Hope of English Architecture"—(Vide *Quarterly Review*, October, 1874). By W. H. White, Fellow. 8 p.m.

**TUESDAY.**—INSTITUTION OF CIVIL ENGINEERS—(1.) "The New South Breakwater at Aberdeen." By Mr. W. D. Cay, M.Inst.C.E. (2.) "The Extension of the South Jetty at Kusturidge." By Mr. Geo. L. Roff, 8 p.m.

**WEDNESDAY.**—SOCIETY OF ARTS—"The Sandblast, and its Application to Industrial Purposes." By Mr. W. E. Newton. 8 p.m.

**FRIDAY.**—ARCHITECTURAL ASSOCIATION.—Lecture (at Willis's Rooms, King-street, St. James's) by Mr. Edmund Sharpe, M.A., F.R.I.B.A., Subject: "The Ornamentation of the Romanesque, Transitional, and Lancet Periods in the North of France, as exemplified in the Churches Visited in the French Excursion (of the Architectural Association, 1874)." 7.30 p.m.

**FRIDAY.**—CIVIL AND MECHANICAL ENGINEERS' SOCIETY—"The Latest Application of Hydraulic Power." By Mr. Ralph H. Tweddell, Assoc.Inst.C.E. 7.20 p.m.

## Trade News.

### WAGES MOVEMENT.

**BRADFORD.**—At a meeting of the Bradford and Shipley district of carpenters and joiners, it has been decided to ask for an advance of 1d. per hour on and after May 29, 1875; that for six weeks before and after Christmas, work to cease at 5 p.m., and no reduction made; that overtime be paid time and half in lieu of time and quarter; that all work taken by the men be considered piecework; that two hours' notice be given to enable workmen to collect and grind their tools before being discharged, or two hours' pay allowed.

**GLASGOW.**—The Clyde carpenters and joiners in Gowan, Glasgow, have determined not to submit to any reduction in wages, and those employed by several large firms have struck.

**LANCASTER.**—The stonemasons of Lancaster have issued a circular to the employers asking for an advance of wages in the summer season from 30s. to 32s. per week, and a diminution of hours from 55½ to 49½; and in the winter season for 30s. per week, instead of 28s. The proposed alterations to come into operation on the 1st of May, 1875.

## The Timber Trade.

Wholesale Prices of timber and deals, &c.  
Per foot super.

	s. d.	s. d.
Honduras mahogany, cargo average	0 4½	0 6
Mexican "	0 4½	0 5½
Tabasco "	0 5	0 6
Cuba "	0 6½	0 10
St. Domingo "	0 7	0 10
" curli "	1 0	2 0
Bird's-eye maple	0 5	0 7
Italian walnut	0 4½	0 5
Black Sea "	0 3½	0 4
Canadian "	0 3	0 4
Cubacedar "	0 4½	0 5
Honduras ditto	0 3½	5 4½
Australian ditto	0 3½	0 4½
Pencil ditto	0 2	0 3

	Per ton.	£ s.	£ s.
Rio rosewood	14 0	20 0	
Bahia	12 0	18 0	
Puerta Cabello zebra wood	7 0	8 0	
St. Domingo lignum vitae	6 0	10 0	
Cuba coccoswood	6 0	8 0	
Ceylon ebony	12 0	18 0	
African billet	12 0	15 0	
Turkey boxwood	5 0	16 0	

	Per foot run.	s. d.	s. d.
Christiana poles	0 1½	0 2	
	Each.		
Fresh lancewood spars	6 0	7 0	
Rickers	0 6	0 8	

	£ s.	£ s.
Quebec red pine (yards and spars)	4 10	6 10
" " (mixed & building)	3 10	4 10
" large yellow pine.	5 10	6 10
" waney board	5 10	6 10
" small	4 0	4 10
" large birch	5 10	6 0
" ash	5 10	6 5
" oak	7 0	8 0
" rock elm	5 10	6 0
American pitch pine	3 15	4 5
Red pine masts	4 10	6 0
Large yellow pine ditto	4 0	6 10
Oregon ditto	9 0	12 0
Kawrie ditto	8 0	11 0
Norway spars	2 0	3 0
Riga fir	3 10	4 5
Baltic crown fir	4 0	5 10
" best middling	3 10	4 10
" good ditto and 2nd	3 0	4 0
" common middling	2 15	3 0
" undersized	2 12	2 15
Stetten	3 0	3 10
Swedish	2 10	2 15
Ditto and Norway balks	2 0	2 15
Crown Memel oak	5 10	8 0
Brack	5 0	
Crown Dantzic and Stetten oak	5 10	8 0
Brack and unsquared ditto	5 0	6 0
Indian teak	11 0	14 0
British Guiana greenheart	12 10	13 10
Australian ironbark	8 10	11 0

	Per square of 1 inch.	s. d.	s. d.
Best yellow	14 6	17 6	
" white	13 6	14 6	
Second qualities	12 6	15 0	

	Per mille of pipe.	£ s.	£ s.
Memel crown oak staves.	235 0	255 0	
" brack	180 0	195 0	
Canadian standard pipe.	65 0	70 0	
United States pipe	35 0	67 10	
" Hhd. heavy and extra	30 0	45 0	
Canadian puncheon (1,200 pieces)	18 0	19 0	
Bosnia single barrel	31 0	32 0	

	Per 18ft. cube.	s. d.	s. d.
Riga crown wainscot logs	5 10	6 0	
" brack	4 15	5 0	
Memel crown	4 15	5 10	
" brack	3 15	4 5	

	Per cubic fathom.	s. d.	s. d.
Petersburg lathwood	8 0	9 10	
Riga, &c.	6 0	7 0	

	FIREWOOD.	s. d.	s. d.
Swedish deal ends	4 10	5 0	
Norway red and white boards	4 0	4 10	
" round and slabs	2 15	3 5	

	Per 120, 12ft. 1½ by 11.	s. d.	s. d.
Quebec, 1st floated pine	20 0	21 0	
" 2nd "	13 0	14 0	
" 3rd "	9 0	10 0	
" 1st bright "	21 0	24 0	
" 2nd "	8 10	9 10	
" 3rd "	10 0	11 0	
" 1st spruce "	10 0	11 10	
" 2nd "	8 10	9 10	
" 3rd "	8 5	9 15	
St. John's "	9 0	9 10	
" battens	8 0	9 0	
Lowerport spruce	8 0	8 10	
Geffe 1 & 2 yellow	4 by 10	13 0	
" 2 by 9	13 10		
" 3rd "	3 by 11	12 15	13 0
" 3 by 7	12 0		
" 4th "	3 by 9	12 0	
" 3 by 11	11 0		
" 2 by 9	12 0		

	£ s.	£ s.
Onega 1st yellow	3 by 11	16 0
" "	3 by 9	16 0
Petersburg 1st yellow	3 by 11	14 5
" "	3 by 9	14 15
" 1st white	2½ by 7	13 5
" "	3 by 9	10 10
" "	3 by 7	10 5
Archangel, 1st yellow		15 10
" 2nd "		12 0
Wyburg 1st		12 0
United States pitch pine		12 10
Axmar 1st yellow	3 by 9	15 0
Skelleftea 1 & 2 ditto	3 by 10	13 5
" "	2½ by 5	13 5
" "	2½ by 8	12 0
Holmsund 1 & 2 yel.	3 by 8	12 0
Kramfors 3rd	3 by 12	9 15
" 4th	3 by 10	9 5
Per 120, 12ft. 2½ by 6½.		
Dram, 3rd white	2½ by 6½	7 15
" 2nd yellow	3 by 6½	9 0
" 3rd "	3 by 6½	8 0
" 2nd "	2½ by 5½	8 15
Per 40ft. 3in.		
Dantzic crown deck		1 5
" brack		0 17

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### TENDERS.

**CHARLTON, KENT, S.E.**—For building dwelling house, boundary walls to wharf, &c., Lower Charlton, Kent, for Mr. Alfred Ardoin. Messrs. Wm. Gosling and Son, architects.

	House.	Boundary walls
Raby	£469 0 0	£91 15 0
Griffiths	420 0 0	91 7 0
Pu man	410 0 0	89 0 0
Cropper Bros.	392 8 6	81 11 6

\* Accepted.

**CLACTON-ON-SEA.**—For the erection of a bazaar and two villas, for Mr. R. G. Hurrell. Mr. Frederick Barnes, F.B.A., and Mr. Edwd. F. Bisschopp, architects, Ipswich.

	Brick walls.	Concrete walls.
Luff	£1,371 0 0	£1,771 0 0
Gibbons	1,775 0 0	
Saunders & Son	1,570 0 0	1,545 0 0
Clark & Son	1,500 0 0	1,335 0 0

\* Accepted.

**LONDON.**—For works in alterations to Nos. 59 and 63, Westbourne-grove, W., for Messrs. Cox, Sons, and Stafford. Mr. Edward J. Paine, architect.

Clark and Co.	£1,210 0 0
Greenwood and Sons	1,199 0 0
Temple and Forster (accepted)	1,150 0 0
Cox	1,121 0 0

**LONDON.**—For warehouse, Queen Victoria-street and Great Knight-riding-street. Mr. Herbert Ford, architect.

Bayes and Hamage	£15,734 0 0
Kilby	15,678 0 0
Adamson and Sons	15,670 0 0
Collis and Sons	15,638 10 0
Williams and Son	15,238 0 0
Browne and Robinson	15,198 0 0
Peto Bros.	15,046 0 0
Elkington	15,026 0 0
Kirk and Co.	14,091 0 0
Scrivenor and White	14,892 0 0
Newman and Mann	14,869 0 0
Lawrence	14,844 0 0
Brass	14,796 0 0
Smale	14,223 0 0
Nightingale	13,785 0 0

**LONDON.**—For warehouses, Queen Victoria-street. Mr. Herbert Ford, architect.

Bayes and Ramage	£4,384 0 0
Collis and Sons	4,367 0 0
Kirk and Co.	4,360 0 0
Adamson and Sons	4,312 0 0
Scrivenor and White	4,273 5 0
Kilby	4,266 0 0
Browne and Robinson	4,229 0 0
Peto Bros.	4,228 0 0
Elkington	4,184 0 0
Newman and Mann	4,117 0 0
Brass	4,097 0 0
Nightingale	4,090 0 0
Smale	4,085 0 0
Williams and Sons	3,997 0 0
Lawrence	3,882 0 0

**BROMLEY, MIDDLESEX.**—For rebuilding the Bromley rice mill. Messrs. A. and C. Harston, architects.

Bangs	£5,269 0 0
Shedfield	5,179 0 0
Harris and Wardrop	4,975 0 0
Sharmur	4,886 0 0
Thomas and Son (accepted)	4,553 0 0

**PADDINGTON.**—For the erection of a new warehouse for Mr. W. Whiteley. Mr. J. E. Saunders, architect.

Trolope and Sons	£21,640 0 0
Higgs and Hill	20,940 0 0
Collis	19,765 0 0
Tarrant	19,664 0 0
Bowles	19,577 0 0
Merritt and Ashby	19,333 0 0
Brass	19,197 0 0
Elkington	18,200 0 0

**STAFFORDSHIRE.**—For pulling down and rebuilding the "Dolphin" Inn, Hanley. Mr. Ralph Dain, architect.

Burslem and Hanley. Quantities supplied.	
Bennett	£4,139 0 0
Inskip	3,797 0 0
Matthews (accepted)	3,747 0 9



WANDSWORTH.—For a pair of villas for Mr. W. H. Strange. Mr. Rowland Plumb, architect. Quantities supplied by Messrs. Sidney Fowler and Roland Plumb.

Gregory .....	£1,905 0 0
Adamson and Son .....	1,762 0 0
Taylor .....	1,757 0 0
Scrivener and White .....	1,648 0 0
Messom .....	1,619 0 0

WESTBURY-UPON-TRYM, STOKES BISHOP, AND SHIRHAMPTON DRAINAGE.—For works under contract No. 1. Messrs. Russ and Minns (Westminster), and Mr. A. W. W. Goulter (Bristol), Engineers.

Newman .....	£14,320 0 0
Summerfield .....	9,975 0 0
Rumbold .....	9,974 12 6
Neave and Sons .....	9,085 4 11
Furniss .....	8,850 0 0
Jones and Jenson .....	8,430 14 0
Bugbird .....	8,390 0 0
Davis .....	7,556 3 4
Baker .....	7,350 0 0
Vickers .....	6,979 0 0
Cooker .....	6,099 0 0

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ABERYSTWYTH, Dec. 14.—For designs of elevations for first-class dwelling houses. Ten guineas will be given for the adopted design. Mr. W. H. Thomas, Town Clerk, Aberystwyth.

KENDAL URBAN SANITARY AUTHORITY, Dec. 15.—For laying out an estate of about 9 acres at Watsfield. Premiums of £10 for the 1st, and £5 for the 2nd best design. Mr. J. Banks, Borough Surveyor, 100, Highgate, Kendal.

PAISLEY, Feb. 1.—For designs with specifications and estimates for the erection of a Town Hall. Premiums of £100 for the 1st, £50 for the 2nd, and £25 for the 3rd best design. Town Clerk, Council Chambers, Paisley.

WIGAN.—For designs for a new market house. Premiums of £50 for the best, and £25 for the second best designs. Mr. W. Peace, Town Clerk, Wigan.

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#### CONTRACTS OPEN FOR BUILDING ESTIMATES.

BLACKBURN, Dec. 19.—For the supply of various materials and labour. Borough Surveyor's Office, Town Hall, Blackburn.

BRAMPTON UNION, CUMBERLAND, Jan. 11.—For the erection of a new workhouse, with entrance buildings, infirmary, &c. Messrs. C. S. and A. J. Nelson, architects, Albert-chambers, Park-row, Leeds.

BRIDPORT LOCAL BOARD, Dec. 17.—For the construction of brick and stoneware pipe sewers. Mr. J. B. Shopland, Engineer, 42, Cricklade-street, Swindon.

BRISTOL, Dec. 23.—For the erection of two warehouses in Victoria-street. H. Williams, architect, Royal Insurance Buildings, Corn-street, Bristol.

CLECKHEATON LOCAL BOARD, Dec. 14.—For the construction of a gasholder, with pipes, pillars, and all other ironwork. Mr. D. Hirst, Clerk to the Board, Cleckheaton.

DARLINGTON CORPORATION GASWORKS, Dec. 14.—1st. For the supply and erection of a telescopic gasholder, 100ft. diameter, and 50ft. high, with columns, guides, girders, &c. 2nd. For the supply and fixing of the whole of the ironwork required for a tramway, consisting of columns, girders, turntables, &c. 3rd. For the supply of the following gas mains, coated, turned, and bored for joining:—600 yards 12in. diameter, 400 yards 8in. diameter, 1,500 yards 6in. diameter, 300 yards 3in. diameter.

Mr. W. B. Emerson, Engineer, Gasworks, Darlington.

DREFFRYN AND GRAIG SCHOOL BOARD, Dec. 29.—For the erection of a school and master's house at Rhwyderyn, near Newport, Monmouthshire. Messrs. Haberson, Pite, and Fawcner, architects, 4, Park-square, Newport, and 38, Bloomsbury-square, W.C.

DEWSBURY, Dec. 23.—For the supply and erection of two iron roofs at the new gasworks, Savile Town. Mr. G. Biddle, Borough Surveyor, Bond-street, Dewsbury.

GREAT EASTERN RAILWAY, Dec. 16.—For the supply of copper, tin, lead, iron, spikes, and other stores. General Manager's Office, Bishopsgate Terminus.

ILKE, Dec. 19.—For the erection of a Baptist Chapel. Mr. J. P. Kay, architect, 12, Corn Exchange, Leeds.

ISLE OF WIGHT, Dec. 16.—For the erection of a new church at Gatten. Mr. C. L. Luck, Carlton chambers, 12, Regent street, S.W.

LANCASHIRE AND YORKSHIRE RAILWAY, Dec. 15.—For the supply of bolts, spikes, brushes, brake-blocks, castings, and various other stores. Mr. W. Badge, store-keeper, Miles Platting, Hunts Bank, Manchester.

LEEDS SCHOOL BOARD, Dec. 16.—For the erection of schools, outbuildings, boundary walls, &c., at Lower Wortley. Mr. W. Lee, Clerk to the Board, St. Andrew's Chambers, Park-row, Leeds.

MIDLAND RAILWAY, Dec. 15.—For the erection of a string, turning, and machine shop at Derby. Engineer's Office, Derby.

MIDLAND RAILWAY, Dec. 15.—For the erection of a new station at Skipton. Engineer's Office, Derby.

NORTH EASTERN RAILWAY, Dec. 16.—For painting the buildings on the Leeds Northern branch. Mr. Burleigh, architect, Bar-lane, York.

RADNORSHIRE, Jan. 1.—For restoring and repairing Llanedegley Parish Church. S. W. Williams, architect, Rhayader.

SOUTH METROPOLITAN SCHOOL DISTRICT, Dec. 21.—For paving the girls' playground at the school at Sutton with either 2in. York stone, asphalt, wood, or tar-paving. J. Burgess, Clerk, Sutton, Surrey.

SOUTH HETTON COAL CO., Dec. 16.—For the supply of timber, iron, castings, ropes, oils, &c. Mr. R. F. Matthews, South Hetton, Fence Houses.

ST. GEORGE, HANOVER-SQUARE, Dec. 19.—For the supply of flint and gravel, granite, and other materials, and for the removal of cinders and other refuse. Mr. J. H. Smith, Vestry Clerk, 1, Pimlico-road, S.W.

TONG-STREET LOCAL BOARD OF HEALTH, Dec. 18.—For the construction of about 4,500 yards of sewers, with gullies, gully-drains, &c. Mr. J. Lumley, C.E., Kirkgate Bradford.

VIRGINIA WATER, Dec. 24.—For making and fixing about 1,000ft. of ornamental terrace wall of Portland stone. Mr. W. H. Crossland, architect, Carlton-chambers, 4, Regent-street, S.W.

WORCESTER, Dec. 14.—For the rebuilding of the branch of the Stourbridge and Kidderminster Banking Co. Mr. H. L. Florence, architect, 3, Verulam-buildings, Gray's Inn, W.C.

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## THE BUILDING NEWS.

LONDON, FRIDAY, DECEMBER 18, 1874.

## ROOFS.

IN every age the covering of buildings must have been looked upon as an art of no mean importance, if not ranking as high as the erection of the building of which it forms a part. We have only, indeed, to come to more modern times to find such things as hidden roofs—coverings concealed behind screens, balustrades, parapets, and other ornamentation, as if a roof were a thing to be ashamed of—too prosaic an object of regard. The ancients, whom we are so wont to imitate, did not think this; on the contrary, the roof became an essential part of the structure—in fact, it became the crowning effort of skill and art. The Greeks boldly exhibited their roofs, and so did the Romans in the best periods. Anterior to them, however, we find the covering made a distinct feature, and all the art of the time appears to have been devoted to this function of architecture. We have only to witness the chambers in Etruscan tombs ten centuries before our era, or the Indian or horizontal system of doming a space, as exhibited in the Jaina temples, to see that the art of roofing was one of considerable importance in the development of the building art. The Romans, who introduced the vault, brought the art of roofing to perfection. In the Pantheon, the Temple built at Spalatro by Diocletian, the Temple of Minerva Medica, we find exhibited the vaulted roof in all its higher excellence. In the last example, scientific construction is carried to a degree of perfection hardly noticed elsewhere, if we except some of the works of the Byzantine architects. This kind of homogeneous roof, when constructed of proper materials, is a form we might do well to imitate. Some of the vaulted churches in the South of France show the pointed vault covered over by the roofing tiles, so as to be, in fact, both an inner and outer roof—a plan they doubtless borrowed from the Greeks or Romans, who covered their temple roofs with slabs of stone or marble. Our Mediæval forefathers somewhat reversed the practice, by putting a wooden roof outside to cover the stone vault, instead of making the latter the external covering. Mr. Fergusson refers to this in his "Handbook," and notices, the great mistake the Gothic architects made in hiding the upper side of their vaults beneath a temporary wooden roof. There is no doubt placing the permanent stone roof outside, and the lighter wooden ceiling inside, was the most common-sense mode of roofing, though a double roof of any kind is a merit that cannot be disregarded, if we consider it in reference to its physical properties.

Our present remarks are not intended to deal with the descriptive or historical part of roofs, which has already been adequately written upon and discussed, but are confined to the consideration of the equally if not more important question of construction as it affects protection from the inclemencies of the weather and temperature. The subject divides itself naturally into the two phases of Construction and Materials. Whether a roof should be constructed on principles of masonry or carpentry we do not discuss here. All we have to consider is what should constitute a good watertight and weathertight roof, and upon this question simply should depend all considerations of form, construction, and style. The first point that arises in regard to construction is the means of support. Our ancestors in the Norman and Gothic styles, adopting a masonry ideal, made their walls abutments for their heavy timber or masonry roofs. This entailed thick walls or buttresses. It was a plan of construction which possessed some advantages, æsthetically, affording mass

and homogeneity, besides the comfort of thick walls; but it is a mode of construction ill-suited to our materials, and not economical. On this ground, the heavy vault or tieless roof of our ancestors must give place to some other kind of construction. We may at once be reminded of the fine timber-framed roofs over our old churches and halls, as those which originated during the latter end of the fourteenth century, as those at Christchurch, Oxford; Hampton Court; Trinity College, Cambridge; Westminster Hall; Eltham Palace, &c. Excellent as examples of timber construction, they are not the kind of roof that commends itself to us nowadays. They are uneconomical specimens of roof-trussing: they bear too great an analogy to masonry construction (as Tredgold observes), and they were also put up in times when our oak forests were abundant and timber was cheap. On the last account alone they are not desirable models for us to copy, however much we find architects of the quasi-Gothic school adopting them. Thus we discard the stone vault and the heavy timber-framed roof as out of keeping with and unsuited to our wants. Even Ware, in his "Body of Architecture," mentions the ponderosity of the roofs of his day. "In practice, roofs," he observes, "are generally made too heavy," and that he will do a most acceptable service to his profession who can show how a roof may be constructed with the smallest quantity of timber, by which an unnecessary load will be taken off the walls, and a large and useless expense saved."

The desideratum is the construction of light, self-supporting, and double roofs. These three requirements comprise the essential qualities of a good roof. We will discuss these objects *seriatim*. The first question to discuss is the angle or pitch of roof, and the best slope of rafter to support the covering without adding unnecessarily to the length of rafter. The load on a rafter increases in the same proportion as its length, but the transverse action of any load on a slant rafter by which it tends to break it is to that of the same load on its horizontal distance or component as the horizontal to the slant length, or the same in both, for the increase of real load on the slant rafter is compensated by the obliquity of its action. But it must be considered that the strain on a slant roof is not merely that of the gravity of its material acting vertically; the strains often act horizontally (as the force of wind), and the resultant of the gravity and the force of wind would act in a direction more or less at right angles to the surface of roof. Therefore, the power or resistance of an inclined rafter to withstand its strain is to the power of its horizontal distance to resist its strain as the latter or short length is to the slant length. Steep roofs, therefore, require stouter rafters than flatter ones to enable them to carry an equal weight of covering per square yard. To attain this equal strength the rafters must be made deeper in the ratio of the square root of their length. Another question arises, viz., the adjustment of mutual support which one rafter gives the other. The best form will be that in which the relative strength of the legs and their mutual support give the greatest product. This is assumed to be the case in a square pitch. Economy has induced carpenters to prefer low-pitched roofs. Bearing in mind that the direct force of gravity or wind is not in the proportion of the length of inclined rafter, but to that of the respective cosine or sine of the angle of inclination which it has, it will be at once seen that the most economic angle is that which presents to each of these active forces the least surface; therefore it follows that the angle of 45° with the horizon, or a roof of half or "square pitch," as it is called, is the best form or proportion of roof. But we must not decide the question of pitch by construction merely. The climate in which we live should determine the matter. In cold climates roofs are

made considerably higher than in warm countries. To this consideration we must add the covering material, which, with us, is generally slate, though lead, iron, zinc, tinned iron, and tiles are sometimes used. Tredgold puts the angle for slate at 26½° with the horizon, or a pitch of *one-fourth* the span; for plain tiles, 29° 41', or two-sevenths the span; and for copper or lead, 3° 50', or one forty-eighth the span. The following weights may be taken as approximate:—

Lead .....	7lb. on a sq. ft. of roofing
Copper .....	1 lb. "
Slates large ....	11·20lb. "
ordinary ..	9 to 5lb. "
Plain tiles ....	17·80lb. "
Pantiles .....	6·50lb. "

To this we must add the force of wind, which Tredgold puts at 40lb. per square foot. Taking these facts into consideration, we think no roof in this climate should have a rise of less than one-third the span, or an angle of 33° 42', which is equivalent to a slope of 1½ to 1. A pitch of half the span should be the normal one for roofs in this climate. This limit is sometimes exceeded, as in our high-pitched Gothic roofs, and in other cases a lower pitch is adopted, and for varying conditions of building and roof-covering we may allow a little latitude here. Very high roofs, as equilateral have disadvantages; they impose thick rafters and heavy weight on the walls, though laterally they exercise less thrust than roofs of flatter pitch. The architect must therefore, in each case, use his own discretion; but for churches and like buildings, it will be found best to adopt a pitch between the equilateral and the square pitch. The most economic results will be attained by this means. The thrust will be reduced to a minimum, therefore, the necessity of heavy bracing timbers will be avoided; the principals or couples will support each other with a comparatively small scantling, and with more economic results than flat or very steep rafters, and the covering itself will be reduced to a minimum consistent with our climate.

We have next to consider the mode of construction. This should depend on the kind of ceiling or inner roof contemplated. The value of an inner ceiling is unquestionable in a changeable climate. It is the only safe protection we have against extremes of temperature; upon acoustical considerations it is better that the ceiling should be as low as possible, that the sound-waves may not be lost in the apex of a steep roof. Now we know that liquids and gases are very bad conductors of heat; organic substances, as wool, feathers, &c., are also bad conductors; hence it is that the clothing of animals is generally of the latter substances, to retain the natural temperature of the body, and prevent its heat being conducted to the surrounding air. A building should be looked upon as a warmth-retaining structure, and any material that may be used to give it this property should be considered as a most vital one. Yet architects build on with solid masonry walls, rejecting both hollow construction and linings of non-conducting materials, as wood-battening. Every building should have a clothing of bad conductors, and we should soon hear of a great fall off in the Registrar-General's returns of mortality. Now air as a gas is one of the worst possible conductors of heat, and therefore, no other argument is required to prove the advantages of hollow or double roofs over single ones. Heat cannot be distributed through air but in one way, viz., by the process known as *convection*, or by a circulation of the warm and cold currents of the air arising from the relative densities of the warm and cold strata. In any mode of framing, therefore, an under ceiling ought to be provided; and this ceiling should be suspended or supported by the framed trusses. The form of such a ceiling should be, doubtless, curved or polygonal. The simplest mode



of constructing a ceiling is that in which the collar is made the ceiled level, and forms the support, the ceiling being continued to the wall line by plastering underneath the rafters. A better plan is the diagonally-braced truss, where the ceiling forms a more complete air space to the wall level, no part of the ceiling being attached to the outer rafters, but the plastering laid on the braces or ribs of the truss. Another plan remains to be noticed, by which a complete isolation of the inner roof may be obtained. This may be done by simple suspension; the ceiling joists being supported on longitudinal pieces or purlins suspended from the main trusses. Or instead of suspending, the purlins may be deep, rigidly braced or trussed girders, extending the entire length of the building, resting on the end gables, and supporting alike the rafters and the ceiling. The latter is a mode which we have never seen adopted, but one admirably calculated to save both timber and labour. No direct ties would be necessary, for every rafter would rest, or be hung as it were, upon the rigid purlin, and no thrust could be exerted on the walls. Why should we confine ourselves to the ordinary methods in use, when actual economy may be combined with direct advantages?

### THE HOPE OF ENGLISH ARCHITECTURE.

AN important discussion took place at the Institute on Monday. The question was, In what position the architect of to-day stands as compared with the master-workman or architect of the Classical or Middle Ages? In other words, Is the profession we now call architectural doing the work of design and construction as well as the masons and artists of the past? wherein does the difference lie?—and whether architecture has not suffered by the change which has placed in the hands of a body of professionals the work that before was delegated to skilled masons, carpenters, and smiths, working under the dicta and by the rules of experience. Now it was not to be expected that the fulminations of the *Quarterly Reviewer* would have seriously been taken into consideration by the recognised body of professional architects. It was strange, indeed, that such utterances should have shaken the Olympus of Professionalism at all; that the Institute of British Architects should have condescended to take in review so arrogant and presumptuous an effort of amateurism. But the fact is ominous. The substratum of truth underlying the strictures of the *Review* which the *Review's* reviewer, Mr. William H. White candidly admitted, was not to be disregarded even by the stronghold of architecture. The fact is architecture needs the vigour of skilled workmen as much as skilled architects. Now it is entirely an art of paper and compilation; there is no life derived from the various handicrafts engaged in it which there formerly was, and our architects are much to blame for this result. They have kept aloof from the artisan and operative; they have designed buildings too much after the fashion of a school or clique of their own making, uninfluenced by the practical elements which should become the very staple of their art. They design and plan in offices, not in workshops, and the consequence has been that the two classes—the architect and the working man—have become estranged to such a degree that they have no mutual regard for each other. The effect has been evident: no interest has been bestowed. The very men who execute have not been taken into confidence, and they work as mere machines, not as thinking artists, in their several spheres. We should like to see masons adding to the fund of knowledge by being so far above mere labourers; carpenters discussing and framing rules of their own on the nature and use of timber;

smiths doing the same in metals, and plasterers in ceramic materials. The common fund of knowledge so made would be readily accessible to architects. But architects do all these things themselves, and many of course imperfectly: they would not tolerate the designs of working men, but why? Simply because they know they have not the knowledge capable of combining and working out their ideas. This can be no fault of their own, but of that very class which has prevented them turning their native talents to account. If the working man had been brought up and educated to think and design for himself, there would perhaps have been fewer architects, but there would certainly have been more originality. The art of every age which has made itself a power was recruited from all ranks; sculptors, painters, smiths, masons, have contributed their quota. But now only one class of minds, and that not always the most prolific in invention, has to sustain the fabric of architecture. The evil arising from an exclusive professionalism is this: It shuts out every view of art but its own, and instead of working as individuals from various standpoints—from points of view of different trades and arts, it begins by assuming one arbitrary standard, to which all should subscribe.

Mr. White's elaborate and learned paper hardly touched upon the practical points at issue. It simply discussed the historical aspect of the subject—whereas the main points are the practical ones involved. In the first place, it is not necessary that an architect should be of the rank of working men, but that he should be a practical man. It is not necessary that he should work with his own hands, but that he should be able to direct those of others. Under the present system of office education we know this is impossible, and it is probably because of the impracticable nature of the Reviewer's suggestions that he has been so taken to task. At the same time we do not see why the name "master-workman" should give so much offence to architects. The derivation of their own designation is that of chief workman—"archos tekton"—and all architects of the present day have to do is to become more technically acquainted with architecture than that acquaintance which mere paper and archaeology will give them.

A good deal of amusement was created by the descriptive and graphic account given by Mr. Phené Spiers about the Reviewer's model workman's design, known as the "Porteallis Club." The design is certainly one calculated to reduce the influence of the writer's remarks. But we ask, whose fault it is that such a hackneyed and poor attempt at sham design should have emanated from working men. Why, surely the fault of modern architecture and architects. The design is simply a reproduction of the kind of architecture which half a century ago would have been deemed in correct taste. So it is bad grace to laugh at a set of men whose only fault has been that they have been a little behind the time. It does not prove what they might have done, had such mock-fronts and pseudo-temples never existed. They can only return the compliment by reminding the profession that similar things were done by architects themselves. They cannot help bad models.

We have other remarks to make on the paper, which we will reserve for another time.

### BUILDING MATERIALS AT THE VIENNA EXHIBITION.

THE reports drawn up by the French working men delegates who visited the universal exhibitions of 1862 and 1867 were, it will be remembered, very favourably commended at the time; and we are now pleased to note that the reports on the Vienna Exhibition held last year are likely to prove of equal if not of greater use to the trades for which they were prepared. Though the distance

and expense were greater on this occasion, and the Government refused to render any assistance, yet, by means of private subscriptions, upwards of a hundred delegates were elected and sent to Vienna, and we have now before us the reports published recently by these skilled artisans.

Prominent among these documents is the report of the Parisian stonecutters, M. Guittou and M. Ballière, whose analysis of the condition of their craft in Austria and in France is replete with information well suited to a book of reference. On reaching the Austrian capital, they were impressed with the abundance of marble, granite, argillaceous and calcareous stones, though stones of gypsum were not so common, nor is it customary to use in Vienna as much plaster as in Paris. The most common Austrian bricks measure 28 centimetres in length, 13 in width, .06 in height; while there are no less than 25 varieties of stone commonly used for building purposes in Vienna. These possess all the necessary qualifications, according to their respective speciality, and the building trade of Vienna can have no cause of complaint in this respect. The most minute details of an architect's design can be successfully executed, and stones of all dimensions are obtained with comparative facility. The greater part of these are taken from the quarries situated only a few miles from the town. It is a notable fact, however, which does not tend to exalt Austrian enterprise, that notwithstanding the great business done in stone from the neighbouring quarries, there has been no attempt to lay down a railway line, and all these stones have to be brought into town by horses. The provinces, especially Bohemia and Hungary, supply their contingent of stones to the capital, and some even are imported from Italy.

The granite from Hungary and Bohemia is generally employed for public works of art, and for funeral monuments. For this latter purpose, it is beautifully polished, and cut with the greatest skill. There were some remarkable specimens of grey-blue granite from these provinces, that are used for millstones; but it was a stone from the quarry of Messieurs Cloetta and Schwarz, near Trieste, which excited the greatest share of attention. It measured 12 metres in length, while it was only 70 centimetres wide and high. We need not, however, mention all the details concerning the specimens of stones sent to Vienna; it will suffice to say that there was a great deal of granite from Prussia, and many stones from France. Belgium was not represented in this concourse—a fact which was the more surprising, as in previous exhibitions the Belgians have proved themselves thorough masters of the art of cutting and polishing. The Carrières de Jaumont in Lorraine, once so much spoken about, when, according to an official but false report, 30,000 Prussians had been annihilated in their quarries, were represented in Vienna by a basin for a fountain, measuring 2.50 metres by 1m. 10. The grain of this stone was red, and seemed too porous to be advantageously used for a fountain. Altogether, after visiting all these specimens, the delegates conclude that the ordinary stones used at Vienna are superior to the stones employed for the same purposes in Paris. There are stones in France as perfect as any that can be desired; but, as stone is used much more extensively by the French than by the Austrians, there have been more researches after the soft stones, that are easy to extract and work.

After these observations, which we have but briefly summarised, the delegates next proceed to study what use is made of the raw materials which the Austrians can so readily obtain. Soft stone, as we have already said, is not so extensively employed in Vienna, and the handsome appearance of the town is due to the general use of stucco and terracotta. In the interior of the houses, the presence, in nearly every case, of stone staircases reaching to the top floor, is a notable feature;



and in this respect the Vienna houses excel the Parisian structures. In Paris there are comparatively but a small number of stone staircases, and these, according to the verdict of the Parisian delegates themselves, are not so lightly and well constructed. The balconies in Vienna vary in width from 1m. 40 to 1m. 80, and are ornamented by a balustrade, which adds to the monumental appearance of the houses.

With regard to the tools employed in the stonecutters' yards of Vienna, they are the same as those used in Paris: but the stonecutters' hammers are of a different shape, and the mattocks are longer and lighter—pointed at one end, the other extremity presenting a broader but sharper edge, similar to what is generally used for cutting soft stone. Nearly all the Austrian tools are badly affixed to the handles, with the exception, however, of the mallet, which is in all particulars an excellent instrument. The yards seem to be well-organised, and the workmen well protected from splinters, &c., by strong wire-work. In the covered workshops there is always a boy employed to sweep away the chips and sand, and he works all day to maintain the order and cleanliness of the establishment. The workman is also invariably provided with a locker where he can put his town clothes by while he works; and many firms have set a room apart for their artisans where they can change their dress before and after work. In France the delegates have never met any employer who displayed the same consideration for his men. Nor is the Austrian workman expected to provide his own tools; and a smith is attached to each firm, at the expense of the employer, to keep the tools in good repair. The saw employed for soft stone is a medium between the carpenter's and wheelwright's saw, while the hard stones are not sawn at all.

The scaffoldings constructed in Austria compare favourably with what is seen in France, for they are far more solid and spacious, and therefore safer. But, on the other hand, the delegates were greatly afflicted at the sight of poor women working as mere labourers, ascending and descending the ladders up to the summit of the highest scaffoldings to convey the bricks in troughs on their backs. In Vienna women work as assistant masons. They clamber about the scaffolding barefooted; they prepare the mortar, and do the hard physical work, while the men are engaged in departments where more skill is required. The ordinary scaffolds in Vienna vary from 2m. 50 to 3m. in width, and the authorities are very severe whenever an accident occurs. In Paris, on the contrary, but little care is taken to protect the lives of the workmen; particularly since the recent compact concluded between certain building companies and assurance societies. A percentage is deducted from the workmen's wages and paid over to an insurance company, so that there is some compensation forthcoming in case of any accident. By these means the French employers have divested themselves of any material responsibility in the matter, and are often shamefully indifferent as to the security of the scaffolding on which their workmen labour. In all these respects the Austrians have a decided advantage.

To return to the exhibition, the delegates devoted much of their time to the study of machines for cutting stone, and they begin this portion of their report by criticising a machine exhibited by Messrs. Johnson and Ellington, of Chester. Though this machine worked well, the French delegates maintain that it cannot equal in excellence or rapidity the work done by hand. The greatest objection is that the stone must be of a certain size to fit the machine, and the process must be repeated several times on the same piece of stone before the result is satisfactory, and this necessitates a double expense of time. The moulding and carving done by machinery were

correct. The Italians had some specimens of stone-cutting machines worked by hand, but these were better suited to stones employed for lithographic than for building purposes. In the Austrian section, the delegates found a perforating machine that required but little space and could be managed by one man, which struck 500 hundred blows in a minute, and was worked by no other motive power than that of compressed air. This instrument might be used with great advantage in quarries to split large blocks. With this and one or two other exceptions, the French delegates do not consider they have much to learn from their neighbours. The mode of utilising cut stones for building purposes is about the same in Austria as in France, but the tools used by the French artisans for cutting the stones are decidedly superior and more handy. The lifting contrivances are inferior to those used in France, excepting for the raising of bricks. On the other hand, the use of ladders for cleaning, &c., the fronts of houses is considered preferable, for the French system of "flying scaffoldings" lowered down from the roof by means of pulleys and two ropes can never be considered really secure. The ropes, however good, must deteriorate in time, and frequently break when least expected. In conclusion, therefore, if the French delegates have failed to gather much technical information at Vienna, they have at least learnt that something more should be attempted to protect human life in France.

#### ITALIAN SCHOOLS OF PAINTING.\*

(Continued from p. 688.)

GIOTTO left in the brilliant track of his genius many lesser lights, besides a larger number of imitators, whose works frequently degenerated into insipidity, while they barely reflected the power and conception of their master. One of the most conspicuous monuments of the early part of the fourteenth century is the Chapter Hall, the Capella degli Spagnuoli in Sta. Maria Novella at Florence. It was founded for the festival of the Corpus Christi by a wealthy Florentine, Guidalotti. Taddeo Gaddi and Martini have both been credited with the frescoes, according to Vasari. This assertion has been discarded by Rumohr. The altar wall has the subject of the Passion arranged in a connected manner on each side of the apsis; on the left is the procession to Calvary coming out of the city, the windows and roofs swarming with spectators, the Virgin and other women following the Saviour with dejected steps. On the hill is the Crucifixion. Underneath, on the right of the apsis, is the descent of Christ into hell; demons, terror-stricken, are seen behind the rocks. An allegorical fresco adorns the left wall of the chapel—the "Wisdom of the Church." In it St. Thomas Aquinas is enthroned between prophets and saints, foremost being Daniel, St. Paul, Moses, St. John the Evangelist. St. Thomas is invested with splendour, a distinction to be ascribed to his canonisation and zeal in promoting the festival of Corpus Christi. The Dominican Order here in their grandest edifice showed special honour to their favourite saint. Seated under a Gothic canopy, holding a book, with the majestic words from the Book of Wisdom, "Wherefore I prayed, and understanding was given me; I called upon God and the spirit of wisdom came to me. I preferred her before sceptres and thrones, and esteemed riches nothing in comparison of her." St. Thomas is represented as typifying dominion over this world's wisdom. The Virtues and Sciences are represented in fourteen female figures, with male figures at their feet, portraits of celebrities in the respective virtue or science. At St. Thomas's feet are three crouching figures with books, representing Arius, Sabellius, and

Averrhoes, the heretics. All these figures display a wonderful mystery of the artist's power, and all are highly expressive of profound reflection and tranquillity, as the head of Cicero and the contemplative expression of Boethius. In the groined ceiling over is the Descent of the Holy Ghost. The whole of the subjects are thus related. While on one side wall is shown the Church's study and tranquillity, the other wall opposite exhibits her external activity. To the left is a large Italian Gothic edifice, the original design of the Cathedral of Florence, symbolising the Spiritual Church; before it are a Pope and an Emperor, the Church's guardians. The Emperor holds a death's head, symbolic of earthly perishableness compared with the eternal Church. Groups of the faithful stand and kneel on each side. To the right is St. Dominick preaching to and converting heretics. The joys and follies of the world are portrayed also in this marvellous wall picture, and the conversion of men fettered in wordly pursuits, while above the church is the door of Paradise, with Christ and choirs of angels. Above, in the triangular space, is the ship (Navicella) of the Church on a stormy sea. A Siene character pervades the fresco of St. Thomas. The Campo Santo or cemetery of Pisa is another noteworthy work of the fourteenth century. It incloses a space about 400ft. by 118ft., and is surrounded by high walls and an arcade. On the east is the chapel and two others on the north. The space is said to be filled with earth from the Holy Land. Giovanni Pisano erected it in the thirteenth century, and the walls are covered by paintings ascribed to Buamico Cristofani (1351). In the Passion is a grand composition. "The Triumph of Death," of which an illustration is given, is a remarkable work of the imagination. "The Last Judgment," another illustration, is a marvellous conception, exhibiting, too, the terrorism of the period, which only art at that age could depict. To Pietro Lorenzetti are ascribed these frescoes, though some uncertainty exists as to the authorship. Spinello da Arezzo painted other subjects on the south wall of the Campo Santo. The "History of Job" is another fine conception in the Giottesque manner; while the "Inferno" must be added. Hell is idealised in the form the Roman Church prescribed, and is divided into four compartments, in the midst of which sits a monster Satan, the personification of a fiery furnace. The progress of works at the Campo Santo was interrupted by political events, and was not resumed till the following century.

The works of the goldsmiths form an important chapter in the history of the Art of the fourteenth century. The altars of churches were adorned by their art, as well as the tables of princes and citizens. When money fell below the demand, these works in gold and silver were melted to replenish the coffers of the time; the result of this conversion is that few of these works remain, and of these few, the silver altar-table of the Baptistery of St. Giovanni, by the celebrated Florentine goldsmith, Cione, is spared. Cione's sons all worked as architects, sculptors, or painters. Andrea Orcagna was the most eminent of his race. He was a worthy follower of Giotto, and was both a painter, sculptor, and architect, and by tradition also a poet. He superadded to the Gothic art the softer sentiment of the imagination characteristic of the Siena school. From Vasari we gather that he learnt sculpture of Andrea Pisano. Orcagna decorated with frescoes the choir of Sta. Maria Novella, Florence. In the Strozzi Chapel we have his "Last Judgment," the "Paradiso," and "Inferno." In the figure of our Lord the conventional aureole is not made the circumscribed feature, and his figures show a foreshadowing of the art of perspective. The date of these works is about 1354. His art power culminated in "Fra Angelico," in whose figure so exquisite a grace is realised. Orcagna excelled in his frescoes,

\* "The Handbook of Italian Painting." By Sir CHARLES EASTLAKE, P.R.A. Revised by Lady Eastlake. London: John Murray.



and his style may be seen in the altarpiece originally in St. Piero Maggiore, in Florence, now in our National Gallery. As a sculptor his fame rests in the tabernacle of Or San Michele; its bas-reliefs are some of the finest in the fourteenth century. In the cathedral at Orvieto he exhibits his architectural skill, as in the mosaic for the front of that building. The spirit of Giotto was represented during the close of the fourteenth century by Spinello da Arezzo, who was of a Ghibelline family, and whose works may be studied in the Sacristy of St. Miniato above Florence, the Campo Santo at Pisa, and the Palazzo Pubblico, Siena. He painted in the choir of St. Maria Maggiore in two chapels of the Carmine. The "History of Lucifer and the Fall of the Angels" at St. Maria degli Angeli, at Arezzo, are the most conspicuous of his known works. The story related by Vasari, and repeated by other historians, that Spinello died of fright from an apparition of Lucifer himself who called him to account for painting him too black, has, like other stories of the same kind, been consigned to the limbo of superstition itself, the painter having died years after the reputed vision at an advanced age (A.D. 1418). Spinello executed various frescoes, but with him the Florentine school may be said to terminate.

Of the Tuscan schools we may mention the name of Duccio, son of a Siennese citizen, and first great painter of the Siena masters. d. 1320). At the Cathedral of Siena are panel pictures of the Virgin and Child enthroned, and a series of scenes from the life of our Lord. MM. Crowe and Cavalcaselle observe that this series are for Duccio what the Chapel of the Arena is for Giotto. They exhibit all the vigorous dramatic expression of his art. In the National Gallery is preserved a Virgin and Child of his. His school of followers retained the grace and sweetness and bright colouring and love for elaborate ornament which distinguished him. After him in note comes Simone Martini (b. 1283). Like Giotto, whose genius Dante enshrined in his noble verse, the fame of Simone was immortalised in the praises of Petrarch. At Assisi must Simone be studied. The frescoes in the St. Martino chapel are assigned to him. He died at Avignon, 1344. A small panel picture of the Virgin and Joseph is in the Liverpool Institution, with the date 1342. His works generally show a total disregard of perspective. Matteo da Siena (1435-1495) was a well-known painter of the Siennese School. In the history of this development of art, the celebrated painter and monk Fra Giovanni da Fiesole, surnamed Angelico, ranks the highest. He was born at Vecchio in 1387. His conceptive power was of the highest order, and he may be ranked as a master of religious art, for which he laboured incessantly. His works show an intensity of religious feeling; lessons in faith were their themes, and the forms were invested with singular beauty and grace, while the colouring was bright and delicate. Unlike some of his school, he made every auxiliary of art tend towards the object of religious instruction; in personal sanctity he is well depicted by Vasari, who has recorded of him that his "life was devoted to the service of God, the benefit of the world, and duty towards his neighbour;" while his pure and simple life animated his art with the noblest motives. Extraordinary as a delineator of variety of expression and the finer qualities of art, he failed in other scientific qualities, as chiaro-scuro and the anatomical accuracy of his figures. Particularly subjective, his art has not been confined to any one school. The illumination of religious books appears to have been his first study. Frate's education is supposed to have been derived from Masolino and Orcagna, though his own subjective power became independent of their influence. Among his best known works are the scenes in the life of Christ—"The Annunciation," "The Flight into Egypt," "Judas Receiving the Money," and

"Christ's Entry into Jerusalem,"—panel compartments from the frescoes formerly in the Annunziata—are engraved in Lady Eastlake's handbook, and give an idea of the power of expression of this Dominican monk. They are now in the Accademia at Florence. The angels of Fra Angelico are reckoned among the purest types of the imagination. In his "Last Judgment" the prescriptive horrors of hell, as Rome prescribed them, are counterbalanced by the Celestial hierarchy, and the rising dead greeting those who have gone before, and show all that art in her best efforts can do to solve the great mystery. The walls of the convent of St. Marco, Florence, display the genius of this monk, and bear witness to his zeal and labour. In the Vatican he painted the lives of SS. Stephen and Lawrence. The Arundel Society have engraved some of these scenes. We have only space to glance at a few of the greater lights of religious art who succeeded. D'Avanzo must be noted as foremost in the early Paduan school of the fourteenth century. His knowledge of perspective and individuality of expression and action, his perfect idealisation of character, are conspicuous, while his forms show more correctness and knowledge than any previous painter showed. The works of Gentile da Fabriano in the Accademia are analogous in manner to those of Fra Angelico, and he exercised much influence over the Venetian school.

The third stage of development, that marking the fifteenth to the commencement of the sixteenth century, exhibited a more correct delineation of form, guided by a deeper study of nature than had hitherto controlled the mind of the artist. This stage, in fact, begins the emancipation of art. For a century past art had passed through different phases, each showing less dependence on traditional and ecclesiastical conventionalism; and a gradually wider range of representation was manifested, owing to the freer scope the artist gave his own mind and feelings. In Florence, art, in her triple relation, attained the zenith of her splendour under the enlightened patronage of the Medici. Architecture, sculpture, and painting, poetry, and philosophy advanced together. The science of perspective and the study of nature rendered art more exact and independent. Masolino, and afterwards Masaccio, grasped and codified the maxims of art. A sense of correct drawing and atmospheric effects are displayed in their works, which were subsequently developed by Raphael. Fra Filippo (1412-1469), a Carmelite friar, in form, colour, and the technical excellences of art, must not be overlooked. His frescoes in the Duomo at Prato are most noteworthy. The Frate's powers are of a high order; in his History of St. Stephen and St. John the Baptist we see a true sense of perspective combined with wonderful grace of line and expression. Some beautiful engravings of Masaccio's and Fra Filippo's works are given, pp. 222, 226. Sandro Botticelli, a scholar of Filippo, distinguished himself in the mythological subjects which the revival of Classic literature at this time in Italy afforded. His frescoes in the Sistine Chapel vie with Michael Angelo's ceiling; his History of Moses is a very fine composition, but his *chef-d'œuvre* is the "Calumny of Apelles," in the Uffizi, of which a woodcut is given. Fillipino Lippi was one of the greatest historical painters of his period; his relationship to Fra Filippo is questionable, seeing that it was common for a scholar to adopt his master's name. One of Fillipino's grand works, the Madonna and Child, with SS. Jerome and Francis, is in the National Gallery, while one or two other fine works are engraved, p. 233. Luca Signorelli is another name. The greatest, perhaps, in the history of Florentine art after Masaccio, was Ghirlandajo, born in 1449. In the technical details he was an unsurpassed master of fresco, while he added the refinements of antique art. We have some

beautiful engravings given, one of the Birth of the Virgin, p. 243, of exquisite beauty and finish. He introduced portraiture largely; contemporaries and personages, rather than abstract ideas, were embodied, and illustrious spectators become tranquil witnesses of the sacred incidents recorded. We have not room here to mention even the best of this master's work. We may here simply add that Perugino, born 1446, together with Leonardo da Vinci, became proficient masters of perspective, which had been reduced to rules by Pietro della Francesca, who carried science and art *pari passu*; while Luca Signorelli inaugurated the art of anatomical action which Michael Angelo so fully developed. His subjects were taken from Classical literature, and the mode was completely introduced by him. To the Umbrian school belonged Pietro della Francesca, an artist of a powerful and exact mind, combining originality and grandeur of conception with the refinements of science. His "Baptism of our Lord," in the National Gallery, attests his skill and power to be of no ordinary kind. To Giotto's conception he added the plastic element of the Renaissance sculptors, and the perspective and anatomy of da Vinci and Michael Angelo.

Passing over other masters of the fifteenth century, we reach the period of highest development, and with it signs of the approaching decline.

#### HINTS TO STUDENTS.—IV.

##### PRACTICAL GEOLOGY.—MATERIALS.

WE have shown that in every art some definite end must be proposed, and that the true artist should begin to know his facts and his tools, and work therefrom as nearly as his own impulses may lead him, keeping in view the desired result as far as he can. By adopting the opposite course he loses his bearing, gropes in the dark, and, in fact, is compelled to keep his model by his side, following it line by line, so ill-acquainted is he with the ground he is travelling over and the nature of the materials in his path. The real artist of every age has been first of all more or less an actual workman. He has proposed to himself the accomplishment of a certain purpose, but he has never taken any work of art as his starting-point or sole guide. We must construct synthetically from actual experiences, commencing with the common facts of nature and the surrounding elements which compose our soil and climate. These naturally belong to geology, mineralogy, inorganic chemistry, and physics. But let us take them as practical facts, not as abstract theories, to begin with, and let us work them out one by one, or in connection with the objects of art.

The first kind of experience or knowledge which the architect requires is that relating to materials, whether natural, as clay, stone, limes; or artificial and cementitious compounds. The very soil he builds upon belongs as essentially to his art as any of those other materials which he fashions. Until he knows something of their properties he must assume all such unacquired knowledge, or take as granted so much from other authorities. The mineral products of the earth, then, first demand his acquaintance. The application of geology to building and architecture especially claim his study. We propose here to consider a few of the useful facts presented by geology. Like every other science, geology was first learnt practically. Tilling the ground, the manufacture of stone implements led the way to the discovery of copper and iron, and by their aid other instruments of greater precision were brought to bear till the art of metallurgy led to the science of inorganic chemistry. In the very earliest civilisation men were applying geology and other sciences whenever they cultivated the ground, worked in metals, or built. The practice of a mechanical art has gradually taught the prin-



ciples of a science, and it may be dogmatically asserted that no science has ever been learnt without. That any other process will ever make a man an artist is very questionable. An architect must take his materials as he finds them in nature, not as already worked into a building. He must begin by learning *how* to build, not by examining and taking to pieces completed buildings, which can only make him a ready analyst, not a constructor. The two things are very different. Now every building is constructed in a certain locality, not here and everywhere. A building is not a universal art product, one adapted equally to this country and abroad; even every locality has its distinctive wants and materials; every locality has its own *facies*. The soil varies in thickness and quality; in some places it is yards in depth, while in other places it is a mere film of alluvial deposit above a rock of granite, limestone, or sandstone. Other soils are of a mixed kind; below the upper vegetable soil may be a subsoil partly partaking of a subjacent rock and partly of the upper soil. A railway cutting or a well may afford us some clue to the nature of a soil. Under these varying conditions it would be perfectly absurd to build a brick structure where a stone one would be cheaper and better, or to design basements in treacherous and pervious subsoils. Yet these things are done every day, for Design in the abstract is the sole arbiter. Of the rocks the architect should be familiar with may be mentioned limestone, sandstone, clay, granite, basalt, and slate. Some of these are in layers, or *stratified*, others in no such order, or *unstratified*. The former are usually inclined, though originally, no doubt, were horizontal deposits. The action of water has formed some of these, and they are hence distinguished as aqueous rocks; while others appear to have been in a state of fusion by heat and are called igneous. *Metamorphic* rocks are those which have lost their aqueous character; such are granite and slate. Of the aqueous rocks may be mentioned limestones, which are stratified; of the igneous, basalt or lava, sometimes stratified and sometimes not. These different kinds of rock often alternate with one another; thus we have metamorphic and igneous rocks mixed with aqueous and interpenetrating stratified rocks. Now the value of these facts, simple as they are, is important to the student, and his own observation will give him better notions of their dependence and practical bearing than all the treatises on geology. A visit to some quarry, or an attentive study of the geological formation of a particular locality, will afford the student a fund of knowledge of a more practical nature than he can possibly obtain from treatises. He should particularly distinguish between the stones of stratified and unstratified rocks, and those easily worked for different purposes and by different tools. Practically he should know what kinds of stone may be worked by pick and wedges, as granites, quartz, rocks, conglomerates, and the harder kinds of igneous or metamorphic rocks; and those which can readily be reduced by the chisel and mallet, as limestones, marbles, and stratified sandstones, or, as they are denominated, freestones. In the neighbourhood of granites and agglomerated sandstones, the working should be confined to the rough reductions of surface, and the style of architecture clearly should appropriate and adapt such modes of working. Masses of large size naturally are the proper utilisation of such materials; hence the static or trabecated system of Greek architecture lends itself with advantage in vicinities affording a supply of granite, as Peterhead, Aberdeen, Cornwall, Devonshire, Guernsey, and other places. Of these materials we shall treat further on: we simply desire here to call attention to the practical importance of the two great distinctions of the stony minerals architects use. Our object is to lead the student to anticipate general conclusions from the facts thrown in

his way. The great end of design is to work out a special object from natural facts. Thus stratified stones should be employed in stratified courses and placed on natural beds, and the carving or working they have should be in strict keeping with the texture and composition of the stone, and not be dictated by a foregone conclusion that because Greek architects employed marble and treated it in a certain manner, we have simply to copy the result.

Soils are derived from rocks. The condition of soil fit for the builder in respect to water supply and drainage must be determined by the nature of the rocks beneath. Soil has been reduced to its pulverulent state by the action of air and water, heat and cold. The masses of rock have been thus reduced by degrees into small fragments. The part performed by the atmosphere in this operation is called *weathering*; the hardest rocks are gradually broken up by the slow yet constant action of the weather. In closely observing the strata of any locality we shall see the gradation between the upper vegetable soil and the rock. All rock exposed to the air, as we find in cliffs or quarries, becomes subject to this attrition of the atmosphere. Even lichen, which first clings to the rocky surface, in time paves the way for other larger vegetation by affording a kind of nourishment or humus which acts chemically on the rock. The roots of mosses penetrate the fissures and crevices, and by growth and expansion exercise a mechanical severance. Other larger roots enter, and the same process, partly mechanical partly chemical, split and disintegrate the rock and reduce it ultimately to powder. In cliff and hilly countries the operation of trees rooting themselves into crevices, and the action of wet and frost may be noticed in a manner leaving little doubt of the efficient way the forces of nature operate in breaking up the rocks. The silent and insidious foe, vegetation, by the humblest beginnings, thus becomes a destructive mechanical agent. Professor Ansted alludes to the enormous power of vegetation in displacing masonry. Roots of olive trees have been seen to lift out of their places huge stones of Cyclopean walls weighing many tons. What vegetation thus begins by mechanical action the destroying atmosphere and its attritive and solvent processes complete. Large holes eaten out of limestones by rain are not uncommon, while even hard granite is found in the Channel Islands to be reduced at the surface to small gravel-like fragments. This is the way soils are formed, partly by the action of wedges in crevices, and partly by the solvent power of water. The lighter and more transportable fragments thus formed are readily removed by showers of rain and wind, and become the alluvial soils of our valleys and river banks.

The constituents of soil may be called *earth*, the disintegrated and decomposed portion, while the fragmentary portions of rock may be termed stones. Clay, lime, and sand compose the principal ingredients of all rocks, and these we will consider in their practical bearings.

A new English church was opened on the 28th ult., at Pegli, near Genoa. It consists of nave and chancel, with small vestry, and will hold 120 persons.

It has been estimated that the total net sum required to be raised by the Metropolitan Board of Works for the year 1875 will be £458,481. 15s. 5d., which is equal to a rate of 5.27d. in the pound on the present rental of £20,886.946. The total net charge for 1874 was £379,174. 9s. 4d., and was equivalent to a rate of 4.41d. on the total rental of the metropolis for that year.

A meeting of the subscribers to the new church at Denbigh, which the Bishop of St. Asaph refuses to consecrate because a panel in the reredos contains a representation of the Crucifixion, was held on Friday, and after a long and animated discussion it was resolved not to make any alteration until the appeal in the Exeter case has been decided. The church, which has been ready for opening for some months past, will consequently remain closed for the present.

## BUILDING PROSPECTS IN EDINBURGH.

(FROM OUR OWN CORRESPONDENT.)

THE year about to close gives no symptoms of decadence in the building enterprise which of late years has done so much for the extension and improvement of Edinburgh. Respectable additions have been made both to ordinary and first-class houses in our streets; the buildings of the Infirmary are still in progress; and at least four churches, including the Cathedral, numerous villas, and a few larger mansions, have left their mark on the heart and suburbs of the city. The prospects of work for the coming year, independently of what is now in progress, are considerable, and embrace proposals for buildings likely to be of architectural importance. The Union Bank offices will occupy the space of three tenements in George-street, and give some character to a street which has only the spire of St. Andrew's Church and the façades of the Commercial Bank to boast of. The extension of the University buildings, and completion of the Industrial Museum, as well as the numerous Schools of the School Board, will keep contractors busy. Subscriptions are being taken for the erection of the Simpson Maternity Hospital, and it is to be wished that the memorial to the late Adam Black could take the form of providing a City Hall, which is much wanted, and would be a suitable monument to one who first displayed his ability for public life in the Council Chamber.

A striking feature in the growth of the city is the tendency of manufacturers to settle in the west, where chimney-stalks are no longer "conspicuous by their absence." Indeed, not so long ago, Edinburgh possessed but two of any magnitude, the one keeping guard at the east end for the manufacture of our gas; the other at the western extremity for making that liquid fire—our whiskey. Now, however, something like a crowd of chimney-stalks rear their smoky heads in the low ground between Morningside and the New West Town. When the mania for St. Mary's Loch was at its height, the encouragement of manufactures was much spoken of, and the cry was met by denouncing any such result as a dire calamity, implying unwelcome additions to the atmosphere, most people being still of the opinion that we cannot have too little of such a dirty thing as smoke, even though deodorising it. It may be affirmed, however, that even were factory chimneys multiplied more than they are ever likely to be, Edinburgh could never be reduced to the same dead and dirty level as Glasgow or Dundee. Its situation is not only at some altitude above the sea, but occupies so much both of hill and valley, that it cannot fail to get the benefit of, if it may not help to create, any breeze that may be going. The name "Auld Reekie" sticks to it, but a smoky or stagnant air has never been a characteristic. That popular appellation is full, not of smoke, but historic and social reminiscences, and exclusively belongs to the city of our Scottish kings and parliaments; when the "lums" were crowded into the long and narrow tail of the castle rock, and the smoke, carved often by atmospheric influence into fantastic shape, was a nimbus of glory in the landscape, not less picturesque in the early sunshine than the march of the morning mist from off the hills around it. But now that Auld Reekie is environed on all sides by additions so much larger than itself, the smoke is lost in indiscriminate volume, which is rarely a nuisance, nor in any danger of becoming chronically so by increase of the factories.

The sanitary condition of the city till very lately has been better than in former years, and the week's mortality per thousand has been as low as 16. In tenements of the ordinary class there is still room for improvement in the sanitary arrangements. The ventilating pipe from the w.c. enjoined by the provisional order is supplied, and no doubt helps to dilute any noxious gas, but it is a delusive substitute for any method which



should succeed in dissipating the evil before it reaches internal outlets.

Church-building has been very active throughout the year. The foundation-stone of the Cathedral was laid in May, and the walls are now built to the top of the basecourse, the chapter-house omitted. The wall surface, external and internal, is of the description now so general, natural faced split rubble in random courses. The blockers are from Craighleith, the external hewn work from Stirlingshire, and the internal from Redhall, near Edinburgh. These latter are both warm in tone, the latter fine-grained sandstone, not unlike Bath stone, and the contrast with the cool grey of Craighleith has a good effect.

The Catholic Apostolic Church, by Mr. Anderson, is at an interesting stage of its progress. The walls are up to the height of the eaves cornice, and the lofty chancel arch erected. In every respect, except perhaps the width of the nave, the edifice is pure Norman. In this portion, with the exception of a richly-carved south door, the details are extremely simple or of early type. The absence of windows at the ordinary levels, and the vast stretch of unbroken wall-surface, gives the building a weird look to Presbyterian eyes, which would sacrifice all the proportions of Gothic architecture for light, and plenty of it. The west end has, at present, all the appearance of a Norman keep, the wall unrelieved by door or window, and with only staircase projections at the corners. Some additions are likely to be made, when the edifice will, doubtless, present a more social aspect to its neighbours opposite. The windows in the sides are large and numerous, all at clerestory height, and continued at higher level but greater intervals round the apsidal sanctuary. At this level a passage is formed in the thickness of the walls, so that one can make the circuit of the building to the staircase opposite the one by which he entered. All the fine architecture is lavished on the sanctuary, which has transepts. The clerestory arcading stands clear of the outer wall, and has clustered piers, bold mouldings, and some rich zig-zag carvings. The decoration of the nave will be the work of the painter or the artist. The altitude of both nave and chancel is considerable, and it is quite safe to predicate of the effect of the design of the interior any superlative you please, no modern church of similar size in the city being comparable, either in point of novelty of design, or purity of the detail, &c. Nor is it, though a Mediæval curiosity, without suggestions for a place of worship where preaching is one great essential of the service. According to recent reports in the BUILDING NEWS, Nonconformist churches have not been altogether successful at their best in the Early English or Decorated Gothic, and would, perhaps, find the Norman a more plastic or pliable style. A church now finishing here at the East-end, for the United Presbyterians, may be mentioned as a fairly-successful example of the class of churches above alluded to. It could not be better described than as modelled on the design commended in a late number of the BUILDING NEWS as the best that has appeared in the way of Nonconformist Gothic. Like this best (and it appears to be the best we have here), the church in question bears evidence of its Nonconformity to the æsthetics of the style adopted. The wide gables and spreading roof, the scanty buttresses and variety in the mouldings, and style of apertures, without organic unity, all bespeak the fear of spending too much money on the parts less exposed to public view. The spire is very successful. That invention of the enemy, the putting long strips of narrow buttressing to a tower which can spare nothing from its breadth, has not been perpetrated here. The apertures are very tastefully chosen and disposed, and the spire has a position at the junction of five roads, where it appears to great advantage.

The work of reconstruction under the Improvement Trust has made some little progress during the year. Trinity College Church still stands unfinished in the wilderness of Jeffrey-street, suggestive to many only of melancholy contrasts

and the desecration of an ancient sanctuary. In Chambers-street, the corner block opposite the University has been erected in very ornamental style, and turns the commonplace South Bridge into pleasing perspective. The proportions of the tenements, and specially the saloons or shops on the ground-floor, are more lofty than usual, and the exterior of the whole seems to lose nothing of its altitude, even by close proximity to the towering height of the college walls. The design is circular, and probably owes its imposing look to the bold projections and solid-looking piers which occur at studied intervals. This is a vast improvement on the old pilaster work, and there are also rich accessories in the form of a balcony and window dressings, which in their variety give a 'charm to the whole, and present a great advance on the tame monotony of repetition of outwork details which make the best streets of the New Town so tiresome.

The widening of the North Bridge has taken longer time for its completion than was anticipated, but it will be shortly opened for the traffic. The trottoir is finished in Val de Travers asphalt, the pleasantest of footpaths, and suggesting the wish that all our pavements were handed over to the Paving Board for reconstruction in that material. The work has been designed for strength, and not for beauty, and as far as strength of construction is concerned, the tramways might be laid upon the pathways. The appearance outside is more of the aqueduct than the viaduct, and is a conspicuous failure as an ornamental feature in the landscape. The situation makes the Bridge so prominent, and the line of communication so important, that something much better ought to have been required. But the authorities here, as in the case of the soldiers' barracks, were either asleep or incompetent to judge of the design on paper, and the attempt made to throw the work open to competition was unfortunately overruled. There was no great demand made on engineering genius, and therefore the artistic in construction might have been more studied. As it is, we have the most commonplace arrangements of box-girders built up of boiler-plates. Girders are placed transversely over the piers, and the spaces between are spanned by the same appliances, carrying the footway and forming the parapet. The ends of the transverse girders are supported by an arrangement of lanky iron bars for brackets, and the parapet above these is forced into a shape something like the pedestal of an equestrian statue. The superincumbent load is out of all artistic harmony with its naked supports, and at some little distance seems to be resting upon nothing. The aspect of the overhanging parapet is extremely heavy-looking, devoid of ornamental surface-work of any merit, and looks gaunt and grim beside the lattice-girder of the railway bridge. Theoretically, if Mr. Alex. Thomson's theory of the Beautiful, as lately reported in the BUILDING NEWS, be true, we ought to have beauty in its perfection here. But facts are stubborn; and as there will always be many who will never see an end of all perfection either in Stonehenge or a square-headed window, so the most of people would much prefer something in the style of Telford's Bridge over the Water of Leith, and, at all events, are thankful for a glimpse of the arches below mere Egyptian lintels, suggestive of nothing so much as of a heavy percentage on material. The old bridge, which was never a beauty, may be the donkey; but now gives the impression of its being most unmercifully loaded.

#### THE EUROPEAN AND AMERICAN BIRCH.

COMPARED with many other timber trees, the birch attains only ordinary dimensions. It is a native of most countries of Europe, especially of the northern mountainous parts. In the extreme parts of the continent of Europe it forms only a small tree or large bush, while in the middle parts it grows to a tree of very considerable dimensions—often 60ft. and 60ft. high. It

is indisputably a native of Britain, and forms, even at the present day, considerable material forests in the north of Scotland. In Strathspey and in Braemar there are natural forests of this tree, which give a very pleasing effect to many of the hill slopes, which otherwise would present a very bleak appearance. The average age in this country is about 115 years. The wood of the birch is white, shaded with red, of medium durability in temperate climates, but much more durable when grown in the extreme north. The grain of the wood is moderately fine, easily worked when green, but apt to chip under the tool when dry. Although extensively used for furniture, it is very liable to rot; but it is admirably adapted for herring-barrel staves, for which purpose it is in good demand, and also for bobbin-making. In Sweden, Norway, and Finland, this wood is most commonly employed by the wheelwrights, and serves for the manufacture of almost all the implements of industry. It is used by turners for bowls, plates, spoons, chairs, &c. In Germany, Sweden, and Russia the Birch is 70ft. or 80ft. high and about 2ft. in diameter; but in France it rarely exceeds two-thirds of that height. The European Birch is so nearly related in its bark, its foliage, the quality of its wood, and in other properties, to the White Birch and the Canoe Birch of America, that it appears to occupy a middle place between these two varieties. Between the White Birch of Europe and the Red Birch of America there is no resemblance except in the suppleness of the twigs, which is more remarkable in the Red Birch. To come now to America, the Red Birch is not, like other species of this genus, seen growing in the midst of the forest, but is found only on the banks of rivers, accompanied by the Buttonwood, the White Maple, and the Willow. The wood of the Red Birch is sufficiently compact and almost white, very little difference in colour being observed between the sap and the heart. This wood offers the same peculiarity, according to Michaux, with that of the June-berry, being longitudinally marked by red vessels which intersect each other in different directions. Although constantly found on the borders of rivers, it is not naturally confined to them. Among all the Birches, the vegetation of this species only is invigorated by intense heat, this quality recommending it for cultivation in the South of Europe and other hot climates, where its timber would prove valuable. The Yellow Birch belongs only to the northern regions of America. It abounds especially in the forests of Nova Scotia, of New Brunswick, and of the district of Maine. In the latter locality it is always found on cool and rich soils, among the Ashes, the Hemlock Spruce, and the Black Spruce. In these situations it reaches 60ft. or 70ft. in height, and more than 2ft. in diameter. The trunk is of nearly a uniform diameter, straight, and destitute of branches for 30ft. or 40ft. It is particularly remarkable for the colour and arrangement of its epidermis, which is of a brilliant golden-yellow, and which frequently divides itself into very fine strips, rolled backwards at the ends and attached in the middle. The wood is inferior in quality and in appearance to that of the Black Birch, and never assumes as deep a shade; but it is strong, and, when well polished, makes handsome furniture; and it is useful for that part of the frame of vessels which remains always in water. In the district of Maine it is preferred for the yokes of cattle and for the frames of sledges; and in Nova Scotia the young saplings are almost exclusively employed for the hoops of casks. It makes excellent firewood, and is transported in large quantities to Boston to be used as such. Its bark is highly esteemed in tanning. Oddy, in his treatise on "European Commerce," states that large quantities of Yellow Birch boards are imported into Scotland, and that they are highly esteemed in joinery. Black Birch is known as "Mountain Mahogany" in Virginia, and "Sweet Birch" and "Cherry Birch" in Connecticut, Massachusetts, and further north. In Canada it is universally called "Cherry Birch." It is to be found in Nova Scotia, in the district of Maine, and in the State of Vermont, though more rarely than the Yellow Birch. It abounds in the Middle States, particularly in New York, Pennsylvania, and Maryland: further south it is confined to the summit of the Alleghanies, on which it is found to their termination in Georgia, and to the steep and shady banks of the rivers which issue from these mountains. It appears to be a stranger to the lower part of Virginia and to the southern and maritime parts of the Carolinas and of Georgia, and probably



also to Kentucky and the western part of Tennessee. In the neighbourhood of New York the Black Birch is one of the earliest trees to renew its foliage. At the close of the winter, the leaves, during a fortnight after their birth, are covered with a thick silvery down, which disappears soon after. They are about 2in. long, serrate, cordiform at the base, of a pleasing tint and fine texture, and not unlike the leaves of the Cherry-tree. The young shoots are brown, smooth, and dotted with white, as are also the leaves. The bark upon the trunks of trees less than 8in. in diameter is smooth, greyish, and perfectly similar in its colour and organisation to that of the Cherry-tree. On old trees the epidermis detaches itself transversely at intervals in hard ligneous plates 6in. or 8in. broad.

The wood of the Black Birch, when freshly cut, is of a rosy hue, which deepens by exposure to the light. Its grain is fine and close, whence it is susceptible of a brilliant polish; it possesses also a considerable degree of strength. The union of these properties renders it superior to the other species of American Birch; and in Massachusetts, Connecticut, and New York, it is next in esteem to the Wild Cherry-tree. Among cabinet-makers in the country, tables and bedsteads of this wood, when carefully preserved, acquire with time the appearance of mahogany: hence it is employed for the frames of armchairs and of sofas; coachmakers also use it for the frames of their panels. The Western Birch was first observed westward, near the sources of the Sweet Water, a northern branch of the Platte, and where it penetrates into the first range of the Rocky Mountains. It only attains a height of from 6ft. to 10ft., and hardly ranks as a tree. The Oval-leaved Birch, growing in the central Rocky Mountain range, and continuing more or less to the banks of the Oregon, is still smaller and useless as far as its wood is concerned. Of the Birch, Thomas, Earl of Haddington, says, "An amphibious tree that thrives upon a wet, dry, rich, poor, clayey, gravelly, or rocky soil. It carries a seed that one of my people pretends how to manage, though hitherto his success has not been great; but as soon as I have seen his way succeed, I shall add the receipt. The way I have taken has been to beg leave of the gentlemen who have woods to allow my people to gather the young birches, but the most of the plants I could get had been ate over. The way I am to take is this—to draw them carefully either in the spring or autumn, and set them where they are to stand. After they have stood a year, I intend to cut them over in the spring. This will make them rise in tufts, and they may be easily reduced to one single stem, and so brought to a tree. No tree is more asked after by the country people, both for their houses, ploughs, and all other utensils of husbandry." After referring his correspondent to Mr. Evelyn, Mr. Cook, and the Transactions of the Royal Society, for receipts for making wine by tapping the birch, he adds, "I have set many of this kind of tree, and if I live, I'll plant many more of them."

#### THE POLLUTION OF RIVERS.

THE fifth report of the Commissioners appointed in 1868 to inquire into the best means of preventing the pollution of rivers was issued on Wednesday, and their conclusions are summed up as follows:—

We are of opinion that any law having for its object the prevention of river pollution should—

1. Absolutely forbid, under adequate penalties, the casting of solid matters into the river channels;

2. Enact the foregoing standards of purity, below which any liquid discharges into water-courses should, with the exceptions already mentioned, be forbidden;

3. Give power to all manufacturers in towns, except those of gas, paraffine oil, pyroligneous acid, animal charcoal, tin-plate and galvanised iron, to discharge their drainage waters into the town sewers under suitable regulations;

4. Confer additional powers on corporations, local boards, manufacturers, and mine-owners to take land compulsorily, under "provisional order," for the purpose of storing their waste refuse, or of cleansing sewage or other foul liquids, either by irrigation, filtration, or otherwise.

We are further of opinion that the equal and efficient administration throughout the country of any Act that may be passed for these purposes would be best secured by the appointment of inspectors, to whom should be committed the

duty of detecting and proving offences against the law, and of procuring the conviction of offenders. We are, moreover, strongly of opinion that in order to secure the independence of these inspectors from local influence they should, like the inspectors under the Alkali Act, hold their appointments from your Majesty's Government.

On the formation of River Conservancy Boards with limited authority for local taxation, and power to authorise and direct expenditure for the purpose of river improvements—as, for example, in the purchase and removal of weirs, the straightening and deepening of watercourses, and the formation of upland reservoirs—we have already stated our opinion in our report (1870) on the Mersey and Ribble basins. There is undoubtedly a large field for useful work in every important river basin both in England and Scotland for a conservancy board of this kind; and it is certain that whenever the necessity of the various river improvements which it would direct and superintend shall have become urgent, a representative body of this kind will be indispensable, having power, in connection with the local and corporate authorities within the river basin, to levy rates for defraying the cost of whatever operations it may direct. But we are convinced that the thing of immediate and imperative importance in connection with river improvement throughout the country is simply the prohibition, under adequate penalties, of the gross pollution which at present renders so much of the running water of this country useless to manufacturers, agriculturists, and the public generally.

The conclusions which we thus humbly submit to your Majesty have been arrived at after an inspection of nearly every town and district in Great Britain where any manufacturing or mining operations of importance are carried on. We have, moreover, personally examined during the past five years 49 woollen factories, 14 works in which cotton is dyed, printed, or bleached, 16 chemical and alkali works, 10 linen, jute, and flax mills, 5 silk mills and dye works, 19 paper mills, 4 paraffine oil works, 4 alcohol distilleries, 4 starch works, 4 tanneries, 1 sugar factory, 2 soap works, 1 salt work, 5 cutlery works, 1 nickel foundry, 4 silver, German silver, and electrotype works, 5 brass foundries, 8 wire, tin-plate, and galvanising works, 3 iron works, 69 mines, besides 43 works for the purification of sewage; and the standards of purity below which we recommend that all liquid discharges into river channels be forbidden have been adopted after an investigation which has involved no fewer than 1,200 analyses of the various drainage waters which offend them, before and after the various modes of treatment which we have investigated, in addition to more than 2,000 samples of river and other waters before and after pollution.

A CONFERENCE was held on Thursday week, in the hall of the Society of Arts, to discuss the steps to be taken to secure prompt and efficient measures for preventing the pollution of rivers. Dr. Lyon Playfair, M.P., presided. The Chairman remarked that the chief object of their meeting was to elicit information which gentlemen present might be able to give on the subjects under discussion. For the more convenient discussion of the subject he thought it would be advisable to treat it under three heads.—First, the existing evils and the necessity of remedy; secondly, the separation of faecal matters, manufacturing refuse, and house drainage from the rainfall; and, thirdly, the methods of treating water-carried sewage, so as to purify it before discharge into rivers. The discussion was then commenced on "The existing evils, and the necessity of remedy."—Mr. Martin expressed the opinion that the enactment of an effective law to prevent the pollution of rivers was the point to which their attention should be directed.—Major-General Scott thought it would be inexpedient for the Government to legislate so as to make any town adopt a system of irrigation or of earth filtration. He thought that Government might insist that the solids should be removed from the liquids before the liquids were thrown into the water. Deodorisation might also be employed. Sir R. Torrens thought it would not be wise to attempt any very large measure of relief until they got a strong public opinion to back them. But a moderate measure might be carried to compel persons starting a mine to deposit £500 or £1,000, as a guarantee that before the water was returned to the stream it should be purified. He would impress upon the meeting the importance

of getting up a subscription, with the view of enlightening the public mind on this subject. Major-General Syngé thought it might become necessary to make a provision that one man should not injure another in this matter.—Mr. Evans said it was all very well to introduce compulsory measures, but it should be remembered that, in a great many cases, manufacturers were so situated that it became almost a matter of impossibility to carry on a purifying process on a large scale. He thought there should be some fixed tests, but, in the first instance, they should be of the mildest possible character.—Sir J. Heron moved the following resolution:—"That this meeting, being satisfied that it is necessary to improve the foul state of the rivers in this country, and that legislation on the subject is required, request the Council of the Society of Arts to urge, by deputation or otherwise, this necessity on the attention of the Government." This resolution, being seconded, was carried unanimously. The conference then proceeded to the discussion of the second head of the subject, "Separation of faecal matters, manufacturing refuse, and house drainage from the rainfall;" but owing to the difference of opinion upon this question, the Chairman thought it might not be advisable to pass any resolution. The Conference then proceeded to the discussion upon "The methods of treating water-carried sewage, so as to purify it before discharge into rivers." Mr. Edward Hall enforced the importance of earnestly considering the questions of street-cleansing and the removal of house refuse. It would be far better to deposit the house refuse in the streets, and have it removed under proper regulations, than to hoard it in and about the house. That would diminish mortality and render the solution of the sewage question more easy. After more observations from several other speakers, the Chairman said he thought the meeting would have felt that the Council of the Society was justified in calling that conference. The meeting seemed to be agreed that the rivers of the country were intended for the whole of the community of the drainage area by which they were affected, and that no manufacturer had a right to take the river and to destroy it for general purposes. He had looked at the different kinds of impurities that passed into rivers, and there was no one class of impurities that might not be dealt with. There was no need to deal with the matter in an arbitrary way. What they had to do was to tell Mr. Disraeli that the thing was possible, and that it should be done. If that was so, he believed the solution of the problem was not very far from accomplishment, and that we should soon see our rivers a pride and a glory, instead of being an eyesore and a disgrace. The Conference was then dissolved.

#### CHIPS.

Mr. David Maxwell, Dundee, has been appointed engineer to the Hull Waterworks.

The parish-church of Rastrick, Leeds, is about to be improved and reseated, at a cost of £500.

New schools are about to be erected at Ballater, N.B. Messrs. Daguid and Sons, of Ballater, are the architects.

The parish-church of Rothwell, Yorks., was reopened on Thursday week, after undergoing extensive repairs and improvements, consisting chiefly in the removal of a gallery at the north side, and the rebuilding of that portion of the church. A new vestry is also being made for the choir.

The Metropolitan Commissioners of Police are negotiating for the purchase of the Queen's Theatre for the purpose of a new police-court, in the place of that now held at Bow-street; £50,000 are asked for the property.

A memorial stained-glass window has been erected in Christ Church, Belfast.

The Cabmen's Shelter at Leeds, referred to in the BUILDING NEWS a few weeks ago, has been opened for almost one month, and appears to be a thorough success. The cab drivers speak enthusiastically of its usefulness. Mr. John Hall Thorp, of Leeds, is the builder, and has been one of the promoters of the movement, which deserves to spread throughout this country.

Rapid progress has been made during the summer in the restoration of Bristol Cathedral. The western doorway approaches completion, and will be one of the most interesting features of the new building.

A north aisle is about to be added to the Church of St. John the Evangelist, Burgess Hill, Sussex. Mr. Talbot Bury, F.S.A., from whose designs the church was built, is the architect.

A new Wesleyan chapel is about to be erected at Crewe, at a cost of £4,000, to seat 1,024 persons.



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## ILLUSTRATIONS.

ST. SAVIOUR'S CHURCH, OXFORD-STREET—PULPIT IN ST. BOTOLPH'S CHURCH, REDGRAVE, SUFFOLK.	
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## OUR LITHOGRAPHIC ILLUSTRATIONS

## ST. SAVIOUR'S CHURCH, OXFORD-STREET, FOR THE DEAF AND DUMB.

WE are enabled to give this week perspective view and four sheets of details of St. Saviour's Church, Oxford-street. The building consists of a lecture-hall below, and a church above. The entrances are in Queen-street. The site is given by the Marquis of Westminster. The shape of the site and the peculiar requirements of its future occupants led to a somewhat unusual plan. The absolute necessity of an uninterrupted view of the chaplain, and the absence of all the usual accessories of organ, choir, &c., seemed to suggest an arrangement somewhat like that of a theatre. This, however, would have been entirely wanting in anything like ecclesiastical character, and would, moreover, have rendered it impossible to light the lower floor sufficiently. The plan was therefore adopted as one which, while meeting all the requirements of the case in a utilitarian point of view, is not without precedent as a form for a church, and is capable of effective and picturesque treatment.

The general arrangement and the external appearance of the building will be seen from the illustrations. The materials are red brick and Bath stone. The extreme length of the building, internally, is 78ft. and the width 48ft. The floor of the church is 10ft. above the street level, and the height from floor to centre of groining will be 42ft. The height from pavement to apex of roof will be 95ft. The church is intended to accommodate 250 deaf and dumb, but it is intended to be used occasionally for ordinary congregations, when upwards of 300 can be seated. The builder was Mr. J. M. Macey, and the architect Mr. Arthur Blomfield, M.A.

## DESIGN FOR PULPIT BY MR. SEDDON.

One of our illustrations is a photo-litho. reproduction of a sketch design for pulpit in the Church of St. Botolph, Redgrave, Suffolk, by Mr. J. P. Seddon.

## PRESERVATION OF WOOD.

A NEW work on this subject has recently appeared in France from the pen of Maxime Paulet, an eminent chemist. The author advocates the use of sulphate of copper and creosote oil, according to the circumstances under which the wood is employed. Sulphate of copper has a poisonous action upon the animal and vegetable parasites which appear at the beginning of organic decomposition. In treating wood which is to be buried in the earth or submerged in fresh water, the solution should be applied in excess, since the effect of moisture is slowly to dissolve the salt. Sea-water acts in this manner so rapidly, that sulphate of copper should not be employed for piles or similar marine structures. In wood soaked with the salt solution, a portion of the latter unites closely with the ligneous tissue, and another part, in excess, remains free. This last, first dissolved by the exterior liquids, slowly retards the removal of that combined with the wood; but the combined portion itself, though more stable, does not entirely escape subtraction, accelerated or retarded according to the rapidity of renewal of the dissolving liquids. On the other hand, for wood destined for aerial structures, the quantity of solution should be diminished, in order to prevent the mechanical effect of intervascular crystallisations. Regarding creosote oil, M. Paulet states that the tarry and carbolic compounds are much preferable to the metallic salts for wood exposed to sea-water, because the naphthalene, aniline, and notably the carbolic acid, exercise an antiseptic action, coagulating the albumen, and thus destroying both the circulation of the sap and also that in the organic parasites. It is pointed out, however, that these substances render the wood inflammable, while the metallic salts have just the contrary effect.

## ELECTION OF DISTRICT SURVEYOR FOR PADDINGTON.

THE election for this District Surveyorship, rendered vacant by the death of Mr. Geo. Gutch, took place at the meeting of the Metropolitan Board of Works on Friday last, the 11th inst. There were thirty-two candidates, whose names, with the number of votes received under the preliminary voting, were as follows:—Messrs. A. Allom, 8; W. A. Baker, 4; T. H. Blashill, 13; Alfred Bovill, 18; John Clarkson, 13; H. H. Collins, 29; T. H. Eagles, 1; Banister Fletcher, 27; Charles A. Gould, 30; Ebenezer Gregg, 12; Horace Gundry, 33; — Hewitt, 3; R. C. James, 1; H. Jarvis, jun., 1; L. Karslake, 10; G. O. Lane, 15; George Lansdown, 22; W. C. Leonard, 3; H. Lovegrove, 1; F. R. Meeson, 22; R. P. Notley, 9; Alexander Peebles, 25; W. T. Piper, 15; R. Richardson, 4; T. Roger Smith, 9; F. Todd, 3; J. G. Turner, 14; Robert Walker, 25; Frederick Wallen, 17; T. H. Watson, 30; and T. W. Willis, 4. In accordance with the usual procedure, all but the six candidates who had received the highest number of votes were ordered to be dropped, but there being a tie between the sixth and seventh on the first voting-list (viz., Messrs. Walker and Peebles), the vote of the Board was taken as to which of these names should be retained, when the voting was: Walker, 19; Peebles, 18. Mr. Peebles was therefore out of the running. The voting then commenced on the six candidates so selected. The first voting was as follows: Gundry, 33; Watson, 24; Walker, 22; Collins, 21; Gould, 20; Fletcher, 19. Mr. Fletcher's name being dropped, the second voting was: Gundry, 28; Watson, 27; Collins, 19; Walker, 18; Gould, 12. Mr. Gould's name being dropped, the third voting resulted as follows: Gundry, 28; Watson, 23; Walker, 17; Collins, 17. There being a tie between the two lowest candidates on the list, the Board voted on the question as to which name should be retained for the next voting: for Mr. Collins there were 18 votes recorded, and for Mr. Walker, 16. Mr. Walker's name was therefore dropped. The fourth voting was: Gundry, 28; Watson, 16; Collins, 14. Mr. Collins's name being dropped, the contest lay between Messrs. Gundry and Watson. The final voting showed 30 for Gundry, and 12 for Watson. Mr. Gundry was therefore declared to be duly elected.

## MODELLING IN CLAY.

MR. ALEXANDER HUNTER, M.D., late Superintendent of the Industrial School, Madras, delivered an address on Monday, before the Royal Scottish Society of Arts, on Modelling in Clay, in which he instituted a comparison between the processes followed in India and those followed in England and in some other countries. He dwelt at the outset on the striking similarity between many of these processes, and on the simplicity and cheapness of some of those in use in the East compared with those in use at home. He had noticed with surprise that the natives in India had acquired a good knowledge of the delicate chemistry of clays for modelling, as also for pottery and porcelain, and of the colours employed in painting, glazing, and even enamelling pottery and porcelain. Introduced about 300 years ago from China, these refinements were, he said, still to some extent cultivated in India; but the art of making pottery and of modelling in clay was known there before the Christian era, and the early Indian work resembled that of the Etruscans and Romans, while still possessing an Eastern individuality. The Indians found the materials for modelling in clay in much greater purity and on a much more gigantic scale in India than was the case in England, and our home manufacturers might profitably take some hints from the simplicity of the Indian processes, which were admirably effectual notwithstanding their cheapness, as well as from the tools in use by the Indians, which were of first-rate steel, or of bronze, and were at once modelling and cutting instruments. What the Indian artists required was a better and more

accurate knowledge of the anatomy of the human figure, and the cultivation of a more Classic taste, which must be brought about by the provision and study of good models.

## A SIMPLE FIRE-ESCAPE.

A SIMPLE and efficient fire-escape has been devised by Mr. Hicks, the inventor of the life-raft, and experiments were made with it last week in London. The escape requires, in the first place, a pair of short chains to be fixed on each side of the window, just inside, out of the way and all but out of sight. These chains have the one a hook and the other an eye, and when required for use are linked together across the window. Into the eye of the chain the main block of the escape is hooked, the escape when not in use being stowed away in a box measuring only 2ft. long, 20in. broad, and 8in. deep, which in a bedroom can easily be stowed away under a dressing-table in or near the window. The escape itself consists of a cage or square-mouthed bag of strong netting, held open by a light iron rim. A light rope is attached to it, and passes through the fixed block hooked on to the window chain. The rope is also rove through a movable friction block fitted with a brake, which is self-acting and is very simply arranged. The cage being hooked on to the cross chain, it is pushed outside the window, and the coil of rope connected with it is thrown into the street. A light guy-rope attached to the cage is also thrown to the bystanders or firemen below, and by this rope the cage can be pulled away from the house clear of balconies or other impediments to descent, and clear also of any flames that may be issuing from the lower windows. As soon as the cage is clear of the window-cill, the person seeking escape gets into it, or places others in it first in the case of women and children. The brake sustains the cradle in its normal position until it is loaded, when it slowly descends to the street level. If it should be necessary to stop it on the way down, a very slight pressure by the person in it on the lowering rope effects the object. The cage is then hoisted up again from below for a fresh load, and, if required, a man can be raised in it. If it is desired to lower the cage very rapidly, the lowering rope is slipped out of the brake-hook, and the descent with several persons can be effected in very much less time and with equal safety. Hicks's escape can be used not only from a window, but from a roof, as on a fire breaking out a man could take one through an adjoining house, get on to the roof of the burning house, slip a rope round a chimney-stack, attach the escape to it, and throw it over the parapet at the desired point. In a private trial recently made before Captain Shaw, the inventor lowered the cage five times with parcels representing women and children, and once with a man, finally descending in it himself, accomplishing the whole in two minutes and a half.

## CHIPS.

The Rector of All Saints, Worcester, Mass., U.S.A., lately applied to the Dean of Worcester, England, for some relic of the old Cathedral to build into a new church now being built in the daughter city. The Dean has complied with the request, and the stones have safely reached their destination.

Egide Charles Gustave, Baron Wappers, the celebrated artist, died in Paris on Tuesday week, aged 71. He was Court painter to the late King Leopold, and produced several fine pictures, chiefly on historical subjects.

A colossal statue of the late Mr. Thomas Cubitt, the well-known builder, who was mainly instrumental in the development of the neighbourhoods of Pimlico and Euston, is in the course of erection, and will surmount a white marble fountain in the centre of Euston-square.

A new church is about to be erected at St. Lawrence, Thanet. The plans have been prepared by Mr. W. E. Smith, of 3, Upper Bedford Place, Russell-square, London, and the building will be erected by Messrs. Smith and Sons, of Ramsgate.









A.A. ARBORY

PLAN, CHURCH LEVEL

SCALE  
0 10 20 30 40 50 feet



*S. SAVIOURS CHURCH · OXFORD STREET · FOR THE DEAF AND DUMB · Arthur Plomfield · M.A. Archt*



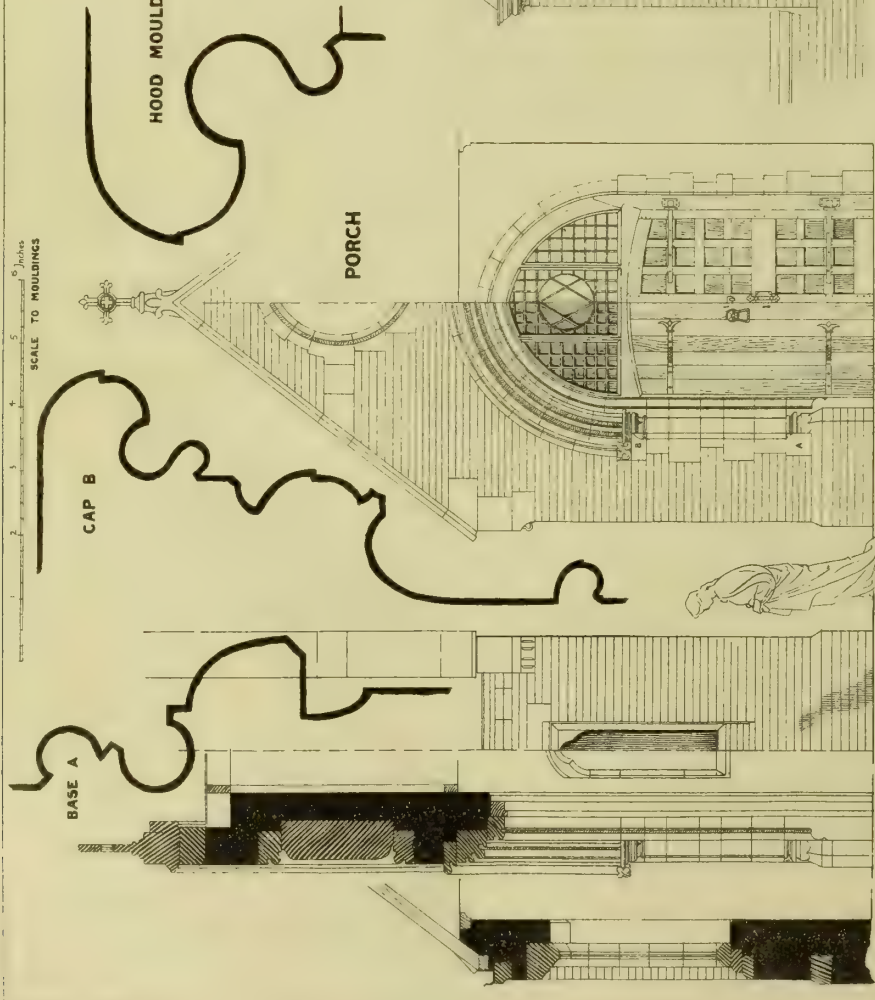




S : SAVIOUR'S : CHURCH : OXFORD : STREET : W :  
FOR : THE : DEAF : AND : DUMB :

# DETAILS OF PORCH ,OCTAGON OVER PORCH , NICHE &c

ARTHUR BLOMFIELD M.A.  
ARCHITECT



## PORCH

## OCTAGON

SECTION OF ROOF

LONGITUDINAL SECTION

## CROSS SECTION

SIDE

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### HALF PLAN OF ROOF TIMBERS

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**END**

SCALE TO PORCH, OCTAGON AND NICHE

## INTERMEDIATE

FRONT

SECTION

Photo Lithographed & Printed by James Akerman St. George for Road W C





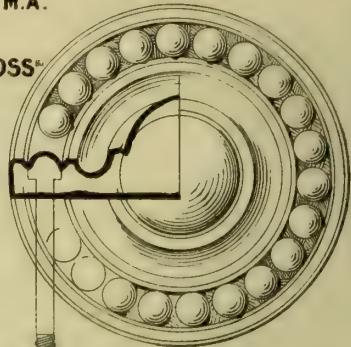


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FOR : THE : DEAF : AND : DUMB :

ARTHUR BLOMFIELD M.A.  
ARCHITECT

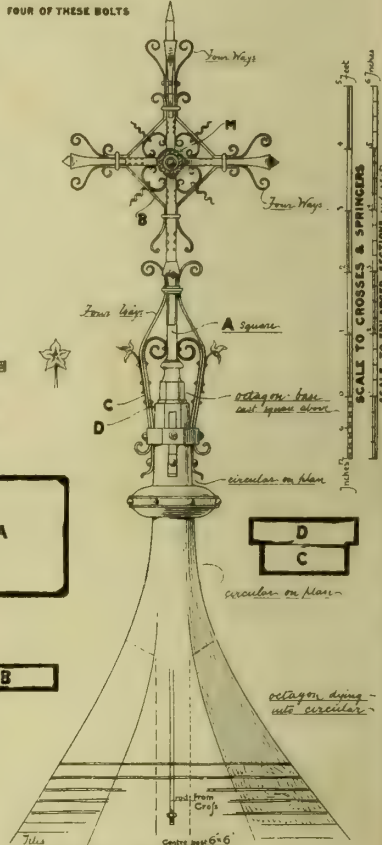
## DETAILS OF NAVE ROOF, VAULTING, CROSS

**PART PLAN OF ROOF SHEWING  
NAKED FRAMING**



**CAST PLATE AT M** *on each side*

FOUR OF THESE BOLTS



**CROSS ON NAVE ROOF**

PLAN | AT Y.Y.

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### SECTION OF RIB

### PLAN OF CURB Z-Z

## ATION OF SPRINGERS

### $\frac{1}{4}$ PLAN OF GROINING

### SECTION OF GROINING

SECTION  
AT FACE OF  
COMMON  
RAFTER

### VENTILATING DORMER

### SCALE TO ROOF AND VAULTING

### SECTION AT FACE OF HIP

### ELEVATION OF SPRINGERS

Photolithographed & Printed by James Akerman 51 Grays Inn Road W C



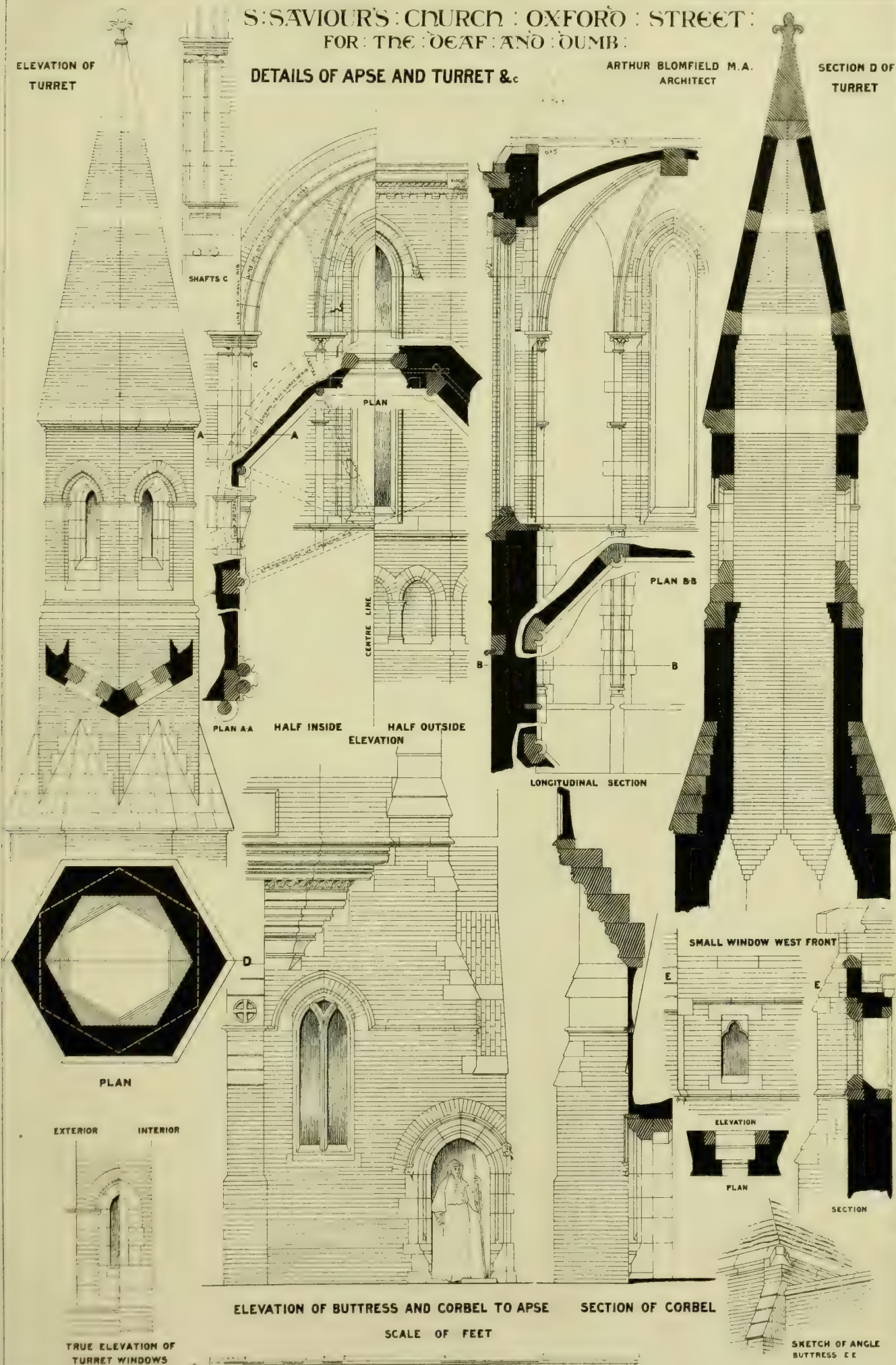
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DETAILS OF APSE AND TURRET &c

ARTHUR BLOMFIELD M.A.  
ARCHITECT

SECTION D OF  
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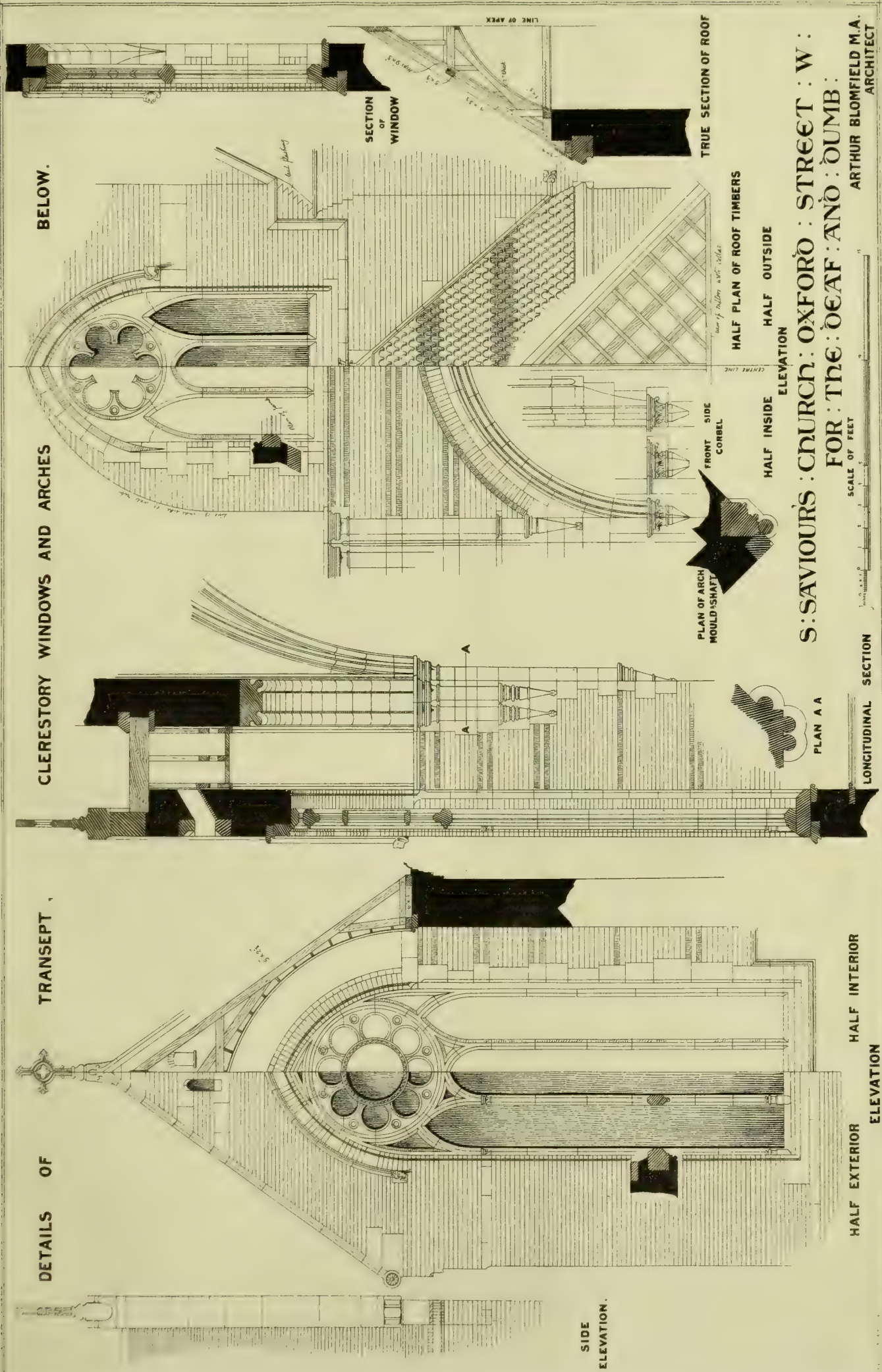
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BELOW.

CLERESTORY WINDOWS AND ARCHES

DETAILS OF

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OF  
WINDOW

TRUE SECTION OF ROOF

HALF PLAN OF ROOF TIMBERS

HALF INSIDE  
ELEVATION  
HALF OUTSIDE

PLAN OF ARCH  
MOULD-SHAFT

FRONT SIDE  
CORBEL

PLAN A A

HALF EXTERIOR  
ELEVATION  
HALF INTERIOR

LONGITUDINAL SECTION

SCALE OF FEET

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FOR : THE : DEAF : AND : DUMB :

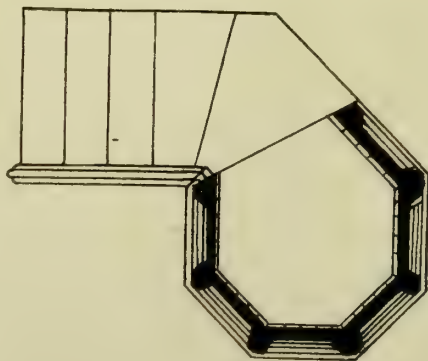
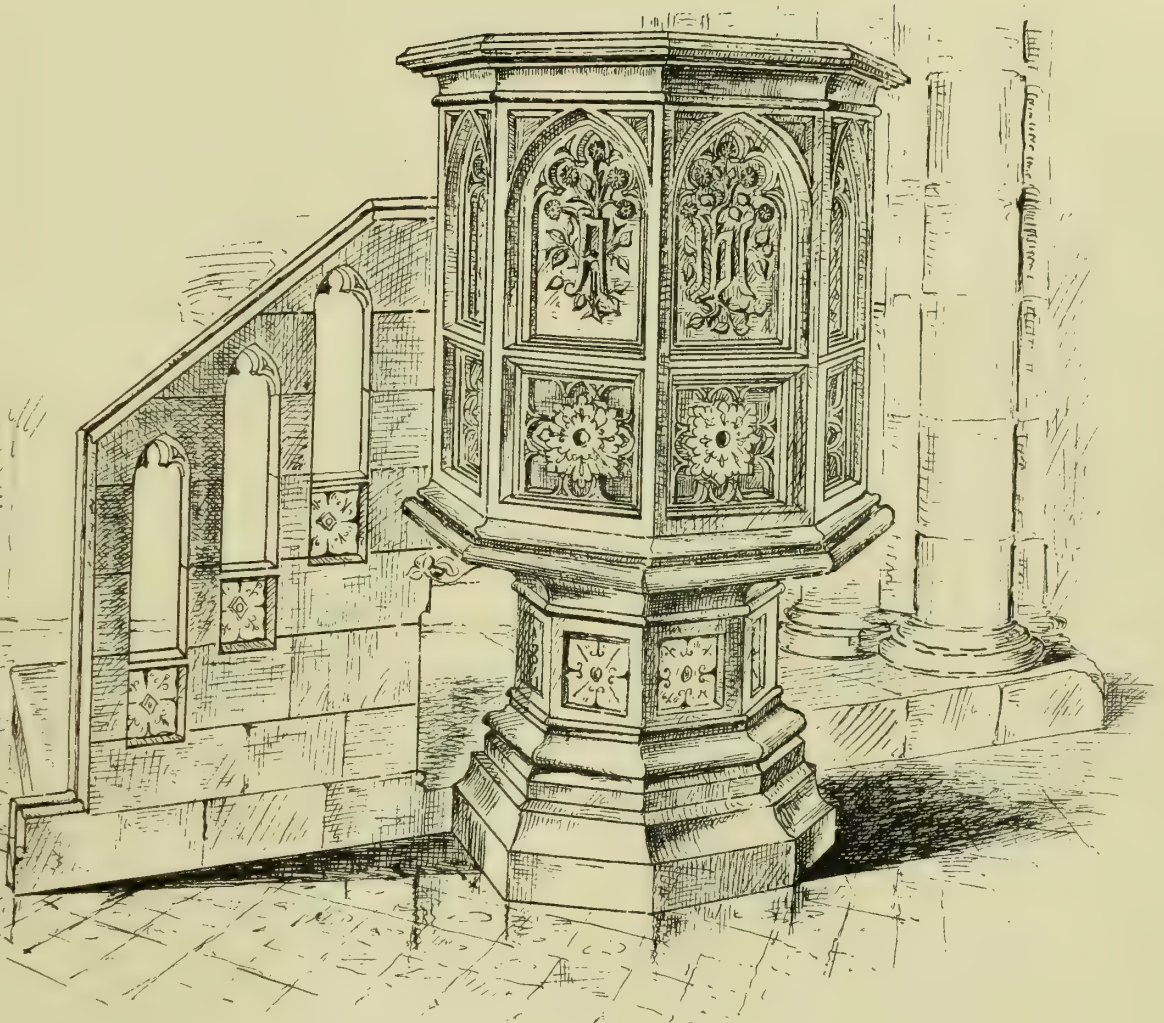
ARTHUR BLOMFIELD M.A.  
ARCHITECT







Design: for: Pulpit: in:  
the: Church: of: S. Botolph:  
Redgrave: Suffolk: &c:



Plan:









## ASPHALTE AND CONCRETE : THEIR VALUE IN ROAD - MAKING AND BUILDING.

FROM a paper lately read before the members of the Liverpool Architectural Society, some useful information respecting the durability and practical value of rock asphalt for road-making is afforded. Rock asphalt, as our readers are probably aware, is a natural product, or limestone, consisting of limestone and bitumen; the proportions of these materials vary, but are generally about 92 parts of lime to 8 of bitumen, with traces of other matters. It is a black, brittle resin, probably formed by the oxidation of petroleum oil, and occurs largely in the island of Trinidad, at the mouth of the Orinoco, Seyssel, Department de l'Ain, Val de Travers, Switzerland, Limmer, Hanover, Lobsann, Lower Alsace, &c. The ancients appear to have known the use of asphalt, as traces have been found in Egyptian and Assyrian buildings. Its modern employment is comparatively recent. About forty years ago it was used by the French in paving some streets in Paris, and other Continental towns have largely employed it for paving purposes, Berlin and St. Petersburg, for example. Discussing the methods of road-paving, Mr. Guthrie instances boulders, macadam, sets, asphalt, and wood. Of boulders little can be said than that they make too rough a surface for easy locomotion; macadam, though more economical at first than "sets," and affording when in good condition easy traction, is, in the long run, in its maintenance and constant want of repairs, and its liability to grind up and make dust and mud, a continual source of expense. Sets such as we see in the Liverpool Docks, either in long bars, or the granite cubes used there and in Manchester and other places, are costly at first, but their subsequent repair is slight. The London streets still testify to the heavy, noisy, and rattling surfaces of "set" laid streets, though some of our important thoroughfares, as Ludgate-hill, Cannon-street, King William-street, Cheapside, and other parts, have, we are thankful to say, become a little less dissonant and grating to the ear by the removal of the old sets and the substitution of asphalt or wood pavings. It seems that a road having 6in. or 8in. of good Portland cement concrete as a bed, faced with 1½in. or 2in. rock asphalt, costs about 16s. a square yard in London, and "the Manchester Limmer Company are prepared to take contracts for the same section at least a shilling less." Comparing the cost of asphalt and wood, the first cost is about the same, but the asphalt is said to have the advantage in the long run. It can be broken up, remelted and relaid; and is nearly worth its original value of from £3 to £4 a ton. The ultimate cost of wood-paving is, therefore, greater, if we assume that it cannot be relaid. Another merit claimed for asphalt is that it can be easily patched in places. The greatest drawback against asphalt as a paving material is unquestionably its slipperiness in damp weather, and to this cause must be attributed the favour which has recently been shown towards wood. There can be no doubt that the wood paving now being laid down in different parts of the Metropolis, in which the blocks are laid on a bed of concrete with the grain vertically placed and the blocks grouted with stone lime, has a far better foothold for the horses' feet, while it is noiseless and pleasant to walk upon. Different plans have been proposed to combine the merits of the two materials. Setting small cubes of wood in asphalt, and cylindrical blocks with their flat ends flush with a bed of asphalt have been tried to meet the demands of foothold and easy traction, but no one plan seems to answer all the ends to be attained. Mr. Guthrie, the secretary to the Manchester Limmer Asphalt and Concrete Company, has designed and registered a kind of paving which presents a roughened surface. It consists simply of short pieces of lathwood saturated in a preservative liquor, and then passed through a vessel containing asphalt in a molten state. The pieces so treated are placed on their edges upon the prepared surface, so that they lean upon

each other at some angle (not right angle) to the ground. They thus make a solid adhesive mass, the edges so packed with the hardened asphalt forming the road-surface. Such a surface (the inventor says) may be dressed to any surface—either rough or smooth—by the use of different gauges of wood. The centre portions of roads for quick light traffic may have a finer finish than the sides for the heavier traffic, and at steep gradients or falls, a better grip may be given to the horse's shoe by making the surface rougher, while on the levels a smoother surface may be produced; in fact, the texture of surface may be varied at different parts. Such a combination would, it is believed, compare favourably with asphalt or wood-paving, while it would combine ease of traction and foothold. A proposal to bore and stud the asphalt surfaces already laid with wooden pegs is made with the same object in view. The other various uses to which asphalt may be applied are pretty well known to our readers. For lining tanks, covering roofs and flats, for damp-proof courses, and for cutting off all connection between drains and buildings, by forming the basement-floors, and lining the basement walls with an impervious skin, asphalt offers innumerable advantages which the architect and builder can fully estimate at their proper value, while, used in combination with concrete, we believe a new era in building may be anticipated.

## ROYAL INSTITUTE OF BRITISH ARCHITECTS.

AT the ordinary general meeting of this Institute, held on Monday evening last, Sir G. G. Scott, President, in the chair, the Secretary, Mr. C. L. Eastlake, announced the decease of Mr. — Fulljames, Fellow. Several donations to the Library having been announced,

Mr. W. H. WHITE, Fellow, read a paper on

### "THE HOPE OF ENGLISH ARCHITECTURE."

He said that an old and venerable review had lately carried on a war of epigram and assertion against the whole profession of architects, not only of this country, but of all civilised countries. A writer of no mean powers of description and invective had passed so sweeping a condemnation of the art-system of Europe, and hurled so much personal abuse at individuals, as to weaken a case still further impaired by exaggerated advocacy. Nevertheless, Mr. White was convinced that the writer had been influenced by a conscientious desire for the reform and advancement of the building art, and that regard for the public good had prompted him to write. An article entitled "The Hope of English Architecture" appeared in the *Quarterly Review* of October last; another article on "The Completion of St. Paul's" was published in October, 1872; and a third, which was called "The State of English Architecture," and which obtained no small amount of notoriety, occupied the first place in the number for April, 1872. These three articles were so intimately allied, both in mode and matter, that it was impossible to reply to one without touching upon the substance of the others. The Reviewer reminded the public that nowadays, "instead of a class of noble working men, we have the architectural profession—a number of soft-handed gentlemen" ("State of English Architecture," p. 305). The majority of architects might justifiably own the soft impeachment. In the same article appeared the following passages:—

"The old builder had not heard anything about the profession of art. He was a simple workman, and would make the plan, arrange the elevations, and be, in fact, the foreman of the work."

"When all our workmen are again restored to intelligence and thought, and are relieved from the bondage that professionalism inflicts upon them, we may reasonably expect that they will again be filled with the 'Spirit of God' to devise curious works."

"The workman, instead of being, like Issachar, 'a strong ass crouching down between two burdens,' would be relieved of the double incubus of architects and law, and begin to have his own again."

In the article on "The Completion of St. Paul's" was the following passage:—

"Workmen should not merely do the work, but should make the entire design. An intelligent workman is far more to be trusted than any of our sketchers and schemers."

In the article on "The Hope of English Architecture," the ruling idea was developed in the following passages:—

"The inspired workman feels the necessary and forever-varying rules of art."

"The habitual notion of the middle and superior classes that the workmen are inferior in . . . the higher qualities of lively genius and imaginative minds is very English. In fact, these men are frequently above their betters in power of mental application and endurance."

"The public should aspire to cultivate the social and artistic friendship of the master workman."

"But we may hear that the upraising of the workman is a revolutionary project, and that its tendency would be to shatter the foundations of society. . . . These true gentlemen would soon become the efficient balance-weight of all society."

"The emancipated workman, gloriously impelled, must always be, and is, the only real hope of English architecture."

Very similar opinions to these have been frequently expressed by the orators and rhetoricians of a neighbouring country. Because the brains of an ordinary workman are only ordinarily developed, and those of an architect are enlarged by education, social refinement, and travel; because living British architects have successfully contested the palm with native talent in European cities; because, at the present hour, a professional man of moderate attainments can always earn, either with pen or pencil, a moderate subsistence; and because, in matters of art, the public are inconsistent and illiterate—therefore architects must be abolished and "noble working men" installed in their places! Had there not been a substratum of truth in the strictures upon modern professional practice published by the *Quarterly Review*, no reply would have been necessary. Isolated sentences from the writings of M. Viollet-le-Duc and others could be quoted to support the reviewer in parts of his arguments and some of his assertions. Years ago, Viollet-le-Duc said that as he belonged to no school, so he was certain to have all schools against him. Of late he had written with excusable bitterness. Among his opponents was the mass of artistic mediocrity who held sinecures at the close of the Second Empire, and he had always had to endure the organised hostility of the Central Art School of France. But as he himself had admitted, his repeated attacks against the unpractical nature of French education, and the small scientific knowledge displayed by ordinary French architects, did not equally apply to this country, because it was the custom of English architects to show, drawn to a large scale, all the various constructive details, and the mode of combining them, and to draw to their real size all mouldings and similar important details, and this before beginning the mechanical details of a building. In France, the details of roofs, girders, windows, staircases, and doors, were often left to be done by the contractors' assistants, and it was only recently that the small but compact Gothic school had introduced a more workmanlike habit. With them, as with the English, a building was built upon paper by the "master of the work" before it was entrusted to the master-workman. There was fundamentally small difference between the conscientious architect of to-day and his brethren of the best period of Mediæval art. Then, as now, the "master of the work" contributed "knowledge, but not manual labour;" then, as now, he knew much of men and countries; then, as now, he was called to foreign lands, and from foreign lands, to construct not one, but many buildings. A great fuss was always being made in the present day about "national" art, and the chronic evaporation and weak patriotism over what was popularly called "Early French Gothic" was a periodical nuisance that set aside both history and common-sense. From the tenth to the twelfth centuries the centre of the art of Western Europe was the Abbey of Cluny; and in the eleventh, twelfth, and thirteenth centuries, art radiated from France into Germany, Spain, and England. Until the fourteenth century the common architecture of France and England developed similarly and together. After the fourteenth century, the architecture of one country developed independently of the other, and then art in England became national, because at that period only commenced the history of the English nation. It was an exaggeration to say, as the reviewer said, that the "system of artistic practice [which he advocated] served for six centuries to make England the finest scene of architectural display that the world has ever seen." ("Hope of English Architecture," p. 365.) The Paris of Philip



Augustus was as superior to the London of King John as the Paris of Louis XIV. surpassed the London of Queen Anne. Since the eighth century, the large abbeys, and even the priories, had established round their cloisters and on their domains workshops of carriers, carpenters, joiners, smiths, goldsmiths, sculptors, and painters. The beginning of the twelfth century was remarkable as the period when the working classes left the seclusion of the cloisters, and formed themselves into lay corporations or guilds, in imitation of those originally organised by the religious establishments, though in changing their centre they merely changed their direction; and instead of working inside the cloister, they worked outside of it. Then, probably, other trades besides that of the masons took the prefix of "free." Once out of monastic leading-strings, architecture, like all the other arts, became an "état," i.e., a trade, business, or profession; and that the extraordinary impulse given to it at the close of the twelfth and the beginning of the thirteenth centuries was the work of a few men was proved from the similarity of form and details which existed in the principal buildings erected at that time in France, Western Germany, and Northern Spain. It was remarkable that many of the buildings erected during the course of the thirteenth century evinced as much neglect in their execution as learning in their system of construction. Buildings were hastily begun, the works hastily stopped, and as hastily recommenced. Much, and that quickly, was required for little money, and the wise deliberation and superintendence of the central authority seemed to have been often wanting. It was a popular superstition that, because Mediæval churches and cathedrals were composed of parts known to have been built at different periods, therefore they took several centuries to build. The fact was that people in those days never "restored;" they pulled down, added, and rebuilt; and the manner in which they did this might still be seen at Laon Cathedral. Was it possible to suppose that the harmony which reigned throughout the majority of Mediæval buildings, not only in France, but throughout Western Europe—the scientific exactness which marked their construction, the order in which their members strengthened and counteracted each other, were produced by gangs of workmen, superintended not by one foreman, but by a gang of foremen, each working independently of the other, according to his fancy or his will, and with no other guiding influence or central authority than that same "Spirit of God," or inspiration, which each shared more or less with his fellow-mortals? That there was sometimes abuse in the relations between the brains and the limbs of the building body—that a more direct communication than was possible at present between the architect and the working man would be advantageous to both, few professional men would deny. But a remedy for this defect would not be obtained by blowing out the brains. Even presuming that Mediæval architects worked with the chisel as well as with the pencil, it by no means followed that if modern architects learnt to use the chisel, their work would be equally as good as that of their predecessors. As well argue that because Phidias and Ictinus were slaves (for which there was only the Reviewer's assertion), therefore, no future building could equal the Parthenon until slavery be reintroduced. There was no doubt, to take a particular case, that viaducts and bridges would be more beautiful and better built than they were at present if there existed co-operative societies whose special work was confined to bridge-building, such as those which flourished in France in the twelfth century. The well-known ruined bridge at Avignon, begun in 1178, and finished in 1188, was the work of the Frères Hospitaliers Pontifes, which was a religious order, established in 1164, for building bridges, establishing ferries, &c. Like the other brotherhoods, it was disciplined, and there were, consequently, both practical and scientific members of it, forming a concentration of technical talent devoted to a particular object. The *Quarterly Review* had informed the world that in old churches and cathedrals the design was obviously done by the workman; in fact, that there was no record of design at all. ("State of English Architecture," p. 305). This was a strange error. Under the word "Drawing," in the Dictionary of the Architectural Publication Society, was a list of the earlier designs and drawings scattered about Europe. On the 19th November, 1860, Mr. Burges read a paper upon the subject to the

members of the Institute. In it he said: "Our series of drawings opens with that of the Monastery of St. Gall, now preserved in the library of that establishment. The plan, which is drawn in thin red lines upon a large sheet of parchment, with inscriptions all over it showing the uses of the different parts of the building, was sent (as one of the said inscriptions informs us) for the use of the Abbot Gospertus, by some anonymous friend, who is supposed to have been Eginhard, the son-in-law of Charlemagne, and who held the office of Prefect of the Royal buildings. The plan presents us with a very complete monastery, with its great church and accompanying buildings. The red line not only seems to mark the external and party-walls, but also to indicate the furniture, such as benches, tables, stoves, &c., requisite to each building. Certain figured admeasurements enable us to form some idea of the sizes of the various parts. A view of the church and monastery of Canterbury, contained in the illuminated psalter of Eadwin, is preserved at Trinity College, Cambridge. It is curious, as showing the complete development of the practice of drawing elevations upon plans, as at St. Gall. In all probability such documents would not be very common; and when the work was done, the erasing-knife would be brought into use, and the parchment, which was very valuable in those days, would receive a new employment. That this was the case we know from the discovery, made by MM. Varin and Didron in 1838, of a design for the west end of a cathedral, besides several details, which they found under the writing of a manuscript containing a list of the deceased members of the Cathedral Chapter at Rheims." The last entry was dated 1270. The drawings, says Mr. Burges, had been first washed out, then scraped over, the lines obliterated with a knife, and finally the parchment was cut into leaves. Most archaeologists had examined the celebrated sketches of Wilars de Honecourt, an architect of the thirteenth century. Mr. Burges remarked a peculiarity of Wilars, which was "that when he copied any executed work, he copied it, not as he saw it, but with variations of his own, and as he would execute it himself." In his remarkable sketch-book Wilars wrote under a particular drawing: "This shows the elevations of the chapels of the Church of Rheims; like them will be those of Cambrai, if they be built." Wilars de Honecourt was the contemporary of Peter de Corbie, another master of the thirteenth century, who directed the construction of several churches in Picardy. They composed together a church upon an original plan, which was described by Wilars, in the sketch-book as "a church with a double circumscribing aisle, which Wilars de Honecourt and Peter de Corbie contrived together." During the Middle Ages, a building called *de l'œuvre* was attached to large religious edifices, which was used by the architect and the master workmen, but the title of architect was not given to an artist engaged in the direction of building works until the sixteenth century. He was called the *maître-de-l'œuvre*, or master of the work—a much more positive appellation than that of architect, which meant only arch-workman; for by *œuvre* was meant everything movable and immovable in a building, from the foundations to the tapestry and furniture. The *œuvre* of Notre Dame, at Strasburg, had preserved the Mediæval custom, and there might still be seen a part of the designs upon parchment which served for the execution of the portal, tower, spire, north porch, throne, and organ-case. There was a curious document extant of the fourteenth century which afforded precise information concerning an architect's functions, and in which there was mention of two Frenchmen being employed to direct the construction of Gerona Cathedral, in the North of Spain. The following was a translation: "The Cathedral Chapter of Gerona in 1312 decided to replace the old Romanesque church by a new one, larger and worthier. The works were not immediately begun, and two administrators of the work, Raymond de Viloric and Arnaud de Montredon, were appointed. In 1316, the works were in full activity, and the name of an architect, Master Henri de Narbonne, is inscribed upon the capitular register. He died, and his place was taken by one of his countrymen, named Jacques de Favaris who engaged to come to Gerona from Narbonne six times a year, and the Chapter guaranteed him a salary of 250

\* Extracted from the Register entitled "Curia del Vicariato de Gerona, Liber Notularum," ab anno 1320, ad 1322, folio 48 (Archives, Gerona Cathedral).

sueños a quarter." The positive evidence of the existence in the fourteenth century of "a class of men who were not workmen, but really and only superintendents of buildings," had been referred to by Mr. Street in his "Gothic Architecture in Spain," Chap. XXI. The title of "Fabricator" in Spanish inscriptions was sometimes, though rarely, given to the architect, who was usually described as "magister operis." At Rheims there was an inscription referring to the cathedral, and also to a neighbouring church, which ran: "Ci git Robert de Concy, maistre de Notre Dame, de Saint Nicaise que trépassa l'an 1311." In the Baptistery at Pisa, in Italy, there was an inscription: "Deotisalva magister hujus operis." But in England, according to Mr. Wyatt Papworth,\* the term "master-of-the-work" appeared to have been seldom employed, and when used, it referred rather to the officer called in Spain and the South of France "operarius," than to the architect. In the extract from the register of Gerona, before quoted, the two administrators of the work were called "operarii." M. Viollet-le-Duc said that the documents which threw any light upon the exact duties of an architect were not anterior to the fourteenth century, and at that time he was "un homme de l'art qui l'on indemnise de son travail personnel." People who wished to build provided materials and hired workmen. Neither estimate nor valuation of the work, nor the administration of the funds, appeared to have concerned the architect. But at the end of the fourteenth century the architect had lost the elevated position he held during the previous two hundred years. In the fifteenth century each corporate body worked in its own way, apart from any general direction. The decline of Gothic art had begun; although the hands of the artists had not lost their cunning, the intellect which had formerly directed them was gone. When the Chapter of Rheims repaired the Cathedral after the disastrous fire which destroyed the upper portions of it in the reign of Louis XI., a *procès-verbal* (dated 1492) was drawn up, in the presence of notaries, of the repairs necessary to be done; and in this agreements seemed to have been made with four master-carpenters, five master-masons, two master-slators, one smith, two master-founders, two joiners, and two master organists, all living at Rheims. The advice of the different trades was taken separately, and the central authority appeared to have been vested in certain canons, one of whom was called master-administrator, and others were designated as having charge of the repairs. No architect was mentioned, and M. Viollet-le-Duc said of what was then done: "The monstrous results of that disorder are to be seen at the present day. The beautiful harmony of the admirable church was destroyed, and its existence endangered." If the *Quarterly Review* was sometimes right in his premises, he was generally wrong in their application. He said that "for three centuries there had been a gradual moderate improvement in the architecture of Greek temples; but under the influence of Phidias this at once rose to perfection." ("Hope of English Architecture," p. 359), but this result was attained from the fact that there had been three centuries of experience, not because Phidias used the chisel, and Ictinus or Callicrates left no record of their drawings. It was incontestable that "owing to the great supply of illustrated works, the means of knowledge far surpass the power of analysis in either the professional or public mind." But who had made the books that were worth anything to architects? Was it not the architects themselves? The Reviewer was eloquent upon "the propensity to scrape and daub," which, within the last thirty years, had "spread like a disease among the clergy." He said that, instead of appealing to architects, "they should have sought the village mason, carpenter, and smith." As if there were any village in England thirty years ago that did not contain traces of the combined efforts of clergyman, mason, carpenter, and smith! It might be useful at the present time to speculate upon the direct patronage of workmen by the Committee now sitting for the completion of St. Paul's. Imagine a sub-committee to be formed of four docile members and two irreconcilable for the purpose of imparting to the foreman at the new Wellington monument the probable intentions of Sir Christopher Wren. Imagine the probable state of that workman's mind when he learnt that if Wren, who died in the eighteenth

\* "The Superintendents of English Buildings in the Middle Ages." Institute "Transactions," 1859-60.



century, had ever visited Italy, he would have adopted the style of the best Italian artists of the sixteenth. The success of direct patronage in such a case was doubtful, because, in the presence of a divided committee, the province of an architect was that of a mediator. He must possess tact as well as education; he must be patient, "ne'er answer till a member cools;" silent, and submit to misrepresentation in pamphlet and review. It might be questioned whether, under similar circumstances, a master workman would have acquitted himself better than Mr. Burges. That the profession was "of the nature of an imposture," and that English architecture was "an artistic Inferno and a national disgrace," was at least amenable to argument. The public having had its attention directed towards some of the abuses of architectural practice, had sometimes visited upon the mass the errors of a few; but since the fourteenth century there never had been a time when the English people more surely promised to imbibe the spirit of art than at present. Art, new to England, was now passing through the ordeal to which English science was subjected more than 200 years ago. In truth, art was suffering from a plethora. Dame Architecture was "in a plethora, absolutely dying from too much health," and this in spite of more than one *fama pas*. But the mistakes of the present must surely instil caution into the artists of the next generation. If, however, the principles of construction were not now uniformly respected, it was because they were not understood by the people; if the philosophy of architecture was only studied by a minority of the profession, it was because it was ignored by the upper classes. Yet the ruling principle of every useful art was preached twenty-four centuries ago. "What," said Aristippus, "can a dung-basket be beautiful?" "Of course it can," said Socrates, "and a golden shield can be very ugly, if the one be well fitted to its proper use and the other not." In the universal acceptance of the inseparable nature of beauty and utility had ever been, and must ever be, the true hope of all architecture.

## DISCUSSION.

Mr. W. WHITE, F.S.A., in proposing a vote of thanks to the author of the paper, said it was inconceivable how a publication of such repute as the *Quarterly Review* should commit itself to such a series of egregious blunders. The only question that arose in his mind was whether they were not attaching too much importance to the article by discussing it at all.

Mr. P'ANSON, in seconding the motion, said that the *Quarterly Review* had said, and quoted the words of a gentleman well known in that room in support of its statement, that there was no novelty whatever in the architecture of the present day. He (Mr. P'Anson) thought that there was great novelty in the architecture of the present day, although, in point of fact, there was no such thing as originality in art. All architecture, for instance, had been developed out of something else which had gone before it. He believed the Victorian epoch of architecture to be as instinct with thought and genius as that of preceding epochs. The reviewer was certainly a little unfortunate in the choice of his illustrations of the "works of art" which the abolition of the architectural profession and the elevation of the working man would bring about. He instanced the "important works of art" produced by the Industrial Dwellings Company, and some "successful results of co-operative industry" near the Wandsworth-road. He (Mr. P'Anson) was unable to appreciate the high ideal to which the Reviewer pointed. The master workman on these works was no doubt appointed, not on account of any artistic ability, but because his services as foreman were to be had for 40s. or 50s. per week. No doubt the architecture of the present day would be very much better than it was if the architect of a building was enabled to give his whole attention to one building until it was completed, but for this he would necessarily require to be far more liberally remunerated than by the customary five per cent. on outlay.

Mr. PHENE SPIERS exhibited on the blackboard an elevation of the "Porticulis Club" in Regent-street, Westminster, which had been much vaunted by the Reviewer not only because it was built by working men without the intervention of an architect, but because of its "architectural merit." Mr. Phene Spiers pointed out the many shams and instances of bad construction exhibited by the facade, much to the amusement of all present except a gentleman whose name did

not transpire, who got up and said it was a pity that Mr. Spiers had made the drawing on the blackboard, and his comments thereupon, inasmuch as architects should not ridicule the working man, but rather strive to teach him.

Mr. EDWARD HALL, F.S.A., strongly advocated the cultivation of closer relationships between architects and workmen as one important direction in which there was hope for the future of English architecture.

Professor KERE deprecated anything like sentimentality with regard to the working man, who was being a great deal too much "petted." The question was one of the greatest interest to architects, quite independently of their relations with workmen. It would certainly be a great mistake to attach too much importance to the utterances of the hysterical Reviewer in question. Architecture as a fine art was alleged to be at its lowest possible position. Whether this was so or not, the Reviewer was not content with denouncing the architecture, but the English language hardly afforded words sufficient to express the force and vigour with which architects were denounced. The respective functions of architect and workman were quite distinct. One cause which led to the profession being brought into disrepute with the public was the existence within its ranks of a few unscrupulous self-assertors. There had been such self-assertors in the profession before, who had elbowed their way into fame and distinction, but who had subsequently died of grief and disappointment. There were happily, fewer men of this class in the architectural profession than in any other. Another class of critics comprised a large body of persons who had been highly educated, and who had to cast about for a subject on which to exercise their intellect. They fastened upon architecture without knowing anything about it. Amateurs had always been most courteously received at the Institute, and they had presumed upon their position to dogmatise upon architectural matters. The true aim of architecture was comparatively humble in the great majority of instances. It was simply to lend a grace to all buildings that were needed. Did the architectural profession of the present day (for it seemed to have been demonstrated beyond the possibility of a doubt, that an architectural profession had always existed from the most remote ages) fulfil its functions fairly well? He ventured to say it did. As to the public, they were generally satisfied with the architecture of the period. Whether in regard to the palatial buildings now springing up all over London, or to the smallest little village church erected by architects, the public seemed well pleased. But, as Mr. White had said, there was a substratum of truth in the reviewer's strictures. The present period in architecture was one of *ad captandum* design, and nothing was so conducive to this as the abominable competition system. Competitions were, therefore, greatly to be deprecated, and the profession should resolutely set its face against them. A most important point now omitted in the studies of the young architect was the study of criticism. Antiquarianism, ecclesiology, and various other interesting but comparatively useless subjects were taught; but the study of architectural criticism was totally neglected. If this study was reverted to, all would go well with the profession and with the architecture of the country.

Sir EDMUND BECKETT confessed himself somewhat disappointed with the conclusion to which the paper and the discussion tended. He had hoped to have heard it declared, on the part of the Institute, that the "hope of English architecture" consisted in some improved scheme of professional education which it might initiate or support. There were many incompetent men in the profession, and there was nothing to prevent any one, however unqualified, from putting a brass plate on his door and calling himself "architect," and practising to the danger of the lives and limbs of the public. What was the Institute prepared to do to alter this anomalous state of things? Much had been said about the necessity and importance of cultivating a good understanding between architect and workman, as they could learn much of each other; but how often was it the case that if a foreman or workman ventured to make a suggestion to the architect he was snubbed and discouraged? He did not agree with Professor Kerr in thinking that the public were thoroughly satisfied with the architectural profession. At the same time, the *Quarterly Reviewer* was evidently ignorant of some of the most fundamental truths in architecture. He

surely never could have designed a building himself, or he would know better.

On the motion of Mr. Roger Smith, the discussion was adjourned to Monday, January 4th, when a paper on "Master-Workmen and Architects" will be read by Mr. J. J. Stevenson. The meeting did not close until nearly eleven o'clock.

## CAPE COLONY.

(FROM OUR CORRESPONDENT.)

THE decision by the Commission with regard to the designs for new Houses of Parliament has been at last published, and I fear "Alma" will be disappointed at the result, after my last communication, which reported so favourably with reference to his designs.

The first prize, of £250, is awarded to "Spes Bona;" the second, of £150, to "Economy;" and the third, of £100, to "Alma;" the Commission further recommends that an additional prize of £100 be awarded to "Southern Cross." "Spes Bona," a colonial architect, now employed in the Public Works Department (Mr. W. Freeman, formerly of Cheltenham), appears to have carried the day chiefly on account of the superiority of the internal arrangements provided by his design, which is Italian Romanesque, with bold and handsome facades. The walls outside are to be of native rubble stone faced with cement, all mouldings also of cement. The main roofs to be of slate, the lean-to roof of offices are of corrugated iron. Main floors are carried on iron girders. The dimensions of buildings are 264ft. by 155ft.; the estimated cost of entire buildings, as designed, is £50,000, but if reduced to meet present requirements £40,000, or £36,000 only if the whole be reduced one-twentieth. The design provides basement floor on a level with natural surface of ground, supplying sundry office accommodations, and kitchen and servants' quarters. On the next—ground-floor, which is approached by a broad raised terrace, with handsome flights of steps and having fountains at either end, are the two debating chambers (one on either side of the Throne Room), and library, retiring-rooms, and other offices. On the first floor are committee-rooms and supernumerary offices. There is a bold portico to the front entrance, and a handsome dome in centre of roof. The drawings in this case are not so effectively prepared as the design, I think, merits that they should have been.

The designs of "Economy" were proposed to be carried out in concrete, with mouldings, &c., in "terra-cotta;" roofs of Vieille Montagne zinc; dimensions 235ft. by 167ft. The estimated cost, exclusive of fittings, £36,000. A handsome central clock-tower was a prominent feature in this design. It had one noticeable fault, which "Economy" may be glad to have pointed out. The rooms were not sufficiently lofty, and were over-lighted for due comfort in a sub-tropical climate. The drawings for this design were most exquisitely prepared, and gained general admiration.

"Alma" proposed to build of brick, with native stone ashlar. The design is of Classic architecture, particularly effective and much approved generally. The dimensions of buildings 261ft. by 261ft., being thus square; the estimated cost was £38,000, but the Commission was of opinion that this sum would not carry out the design. The drawings and specifications, too, were considered incomplete; yet with all, as I have said, this design was greatly in favour, and hence the wish to combine if possible its bold and handsome facades with the carefully and well adapted plan of "Spes Bona."

The "Southern Cross" designs were of Early Gothic, and found many admirers, but Gothic is not a suitable style of architecture for warm climates, and these designs were at once condemned, though the drawings were most perfectly prepared and the whole thing carefully worked out. The dimensions were 160ft. by 152ft., and estimated cost, without fittings, £37,000, and with fittings £43,000.

The designs of "Argo," "London," and "Royal Arms," appear to have been quite out of the competition, and I need hardly burden your readers with descriptions. To "Royal Arms" I would suggest a term of application to the study of Architecture.

The difficulty as to the new theatre in Cape Town, reported in my last, seems to have been a "storm in a tea-pot." Professional men have pronounced the building perfectly reliable.

Cape Colony, Nov. 11, 1874.



## THE STORAGE OF WATER.

A meeting of the National Society for the Promotion of Social Science, held on Monday evening, in their rooms, Captain Douglas Galton, C.B., presiding, a paper upon "The Storage of Water" was read by Mr. J. Bailey Denton, C.E., F.G.S.

Mr. DENTON, at the commencement of his paper, separated, in his consideration of the subject, England and Wales from Scotland and Ireland, the physical and meteorological conditions of these two latter countries being so different from those of the former. The rain falling upon 4,320 acres of surface, he said, is more than sufficient to supply the whole of the present population of 25,000,000 with drinking-water, taking the average amount required for each individual at 125 gallons. England and Wales contain 37,324,883 acres of surface, so it followed that the rain falling upon one acre out of every 8,640 was sufficient for the whole people. But the liquid actually drunk does not reach a fiftieth part of the average consumed for household and trade purposes. If we count our future population by the rapid increase which has taken place up to the present time—the census showing that the population has doubled itself in fifty years—we may reach at the end of the next fifty years a total requirement of 1,250,000,000 of gallons of water daily, or 456,250,000,000 per annum. Having reference, however, only to the quantity of water serviceable to the population without derangement of the régime of rivers, the minimum available quantity at disposal after absorption by subterranean supplies and springs would give at least thirty times the utmost quantity that could be wanted by the population and domestic stock within the next fifty years, so that we wasted in this way thirty times as much water as we might require for the next fifty years. After referring to the necessity of an abundant supply of pure water, he mentioned the advantage of an inquiry into the best means for storing water instituted by the Government with all the powers of a Royal commission. It might, he said, be sufficient to show the importance of this by stating that there are certain communities at present in existence which receive more than fifty gallons of water per head, while others receive less than ten gallons per head. Agricultural labourers living in many villages badly supplied with water have, during the past year, paid as much as 2d. per pail for their supply, and one pail of water had often to serve the purpose of a household of six or seven persons. The principal duties of such a proposed Royal commission the writer comprehends under five heads:—First—to ascertain the extent and character of districts suffering from an absence of supply, or an insufficient quantity of water required for domestic, trade, and agricultural use, having reference to the greater density of population in some districts compared with others. Second—To investigate the capability of raising water from subterranean sources where nature has stored it in the water-bearing strata, or of collecting rain-water on the surface before it is absorbed or can be contaminated by mixture with putrescible matter. Under this branch of the inquiry little or no attention, he maintains, has been given to the immediate and prospective effect of any large drought upon these subterranean supplies, although many of our principal rivers are maintained by springs which find a discharge at the higher outcrops of impervious strata, which form the impounding basins, or in the beds of the river themselves. This remark would especially apply to the Metropolis, where, if the 200,000,000 gallons of water which may be daily required fifty years hence, were pumped up from the chalk beneath, the higher springs of the London basin feeding the tributaries of the Thames, and other rivers, would be gradually reduced, and ultimately vanish, to leave rural towns, villages, houses, and mills dependent for water upon them without any supply at all. Third—The capability of storing water in the upper valleys of river systems, to secure in some instances, potable water not to be obtained from the river itself, and in others to maintain in our rivers a more equal flow of water by compensation in kind, for water taken out of them. In very many instances it would be found that this capability exists, and that, moreover, water may be conserved for the profitable service of mills. Such an investigation would show that mills are not necessarily inimical to the proper drainage of the country, although in many cases they are found to be so under present con-

ditions. Fourth—The supply of water to villages and small towns where no public supply, nor sufficient private supply, exists, he deems, perhaps, the most important object to which the inquiry should be devoted. The capability of storing rain-water and spring-water for these purposes which existed on most estates should be exercised by the owners, who, either willingly or by compulsory measures, could be made to assist. Fifth—The mode of constructing reservoirs and tanks, and their cost, the ready purification of the water of small streams when turbid by its filtration through soil, and the use of water and wind in winter, when there is no deficiency of either, to lift the water to be stored for summer use, were severally objects worthy of inquiry. An underground tank, capable of holding 2,500 gallons, might be made for £6 or £7, and this would afford a supply to a household of five persons using four gallons per diem for more than a third of the year. In conclusion, he believed that the collection and publication of information of the practical character suggested, as a complement to the scientific researches of the Rivers Pollution Commissioners, would do more to strengthen the hands of the Local Government Board, and remove the hesitations and contradictions which seemed to prevail among its officers, than any step that could otherwise be taken.

Mr. C. W. RYALLS, LL.D., the secretary, referred, as an illustration of the difficulty in getting a proper supply of water, to the case of the town of Wakefield, where many thousands of pounds were spent, and yet the object was not attained. Many places suffered in consequence of the collieries tapping the streams that formerly supplied them. —Mr. Edward Eastman thought there should be reservoirs all round the coast at a sufficient height to supply the adjacent country. —Mr. Baldwin Latham said the population had not only doubled, but had also become more scattered, and manufacturers, driven to the country, had polluted the streams of pure water with various deleterious ingredients. In the Sanitary Act there should be power to compel owners of property to construct proper receptacles for the storage of water. In mining districts, if the proprietors took precaution, the water might be kept out of the mines and secured to the towns. —The Chairman said he knew some villages in Berkshire where the prevalence of typhoid fever among the inhabitants was referred to the fact that the water consumed came from some streams impregnated with sewage; and yet the landlord did not seem to think he was liable for any improvement in the mode of supply. —Mr. Storr thought a permanent Royal Commission should be formed to decide all cases of water dispute, and so save the chaos that annually existed in the conflict of interests before Parliamentary commences. —Mr. Denton, in his reply, said that some of the deepest thinkers on the water economy of the country were of opinion that the rivers of England were doomed; that they would soon be locked up against all drinkers of water, they were so injured by the materials that got into them.

## ANCIENT OAKS.

SOME of the most ancient oak-trees in existence are the King's Oak, in Windsor Forest, which is more than a thousand years old, and quite hollow. Professor Burnet, who once lunched inside this tree, said it was capable of accommodating ten or twelve persons comfortably at a sitting. The Beggar's Oak, in Bagshot Park, is 20ft. in girth at 5ft. from the ground, and the branches extend from the trunk 48ft. in every direction. The Wallace Oak, at Ellerslie, near where Wallace was born, is 21ft. in circumference; and Wallace and three hundred of his men are said to have hid from the English army among its branches when the tree was in full leaf. The Parliament Oak, in Clipstone Park, which is supposed to be the oldest in England, derives its name from the fact that a Parliament was held under its branches by Edward I., in 1290, at which time it was a large tree. The oak in Yardley Chase, immortalised by Cowper, is also a conspicuous and venerable relic. The Winfarthing Oak, now a bleached ruin, is said to have been an old tree at the time of the Norman Conquest, in the eleventh century. The Greendale Oak, in the Duke of Portland's Park, at Walbeck, is described by Evelyn and figured by Hunter, with its trunk pierced by a lofty arch, through which carriages have been driven. The Conthorpe Oak, in

Yorkshire, measures 78ft. in circumference, and its age is estimated at eighteen hundred years. The Great Oak of Salcey Forest, Northamptonshire, a picturesque wreck, is supposed to be of equal antiquity.

On the Continent, an oak was felled at Bordza, in Russian Poland, some forty years ago, upon which seven hundred and ten consecutive layers were distinctly counted, and the space in which the layers could not be counted was estimated to contain three hundred more, making the whole age of the tree a thousand years. Near Saintes, in France, an oak is standing which is said to be upwards of ninety feet in circumference. A room has been cut out of the dead wood of the interior, about twelve feet in diameter, and a round table has been placed in it, at which twelve guests can be seated at once. The full age of the tree is estimated at two thousand years.

## COMPETITIONS.

ARLESEY SCHOOL BOARD.—Out of fifty designs submitted in this competition, two were selected for further consideration. Ultimately the design submitted by Mr. J. Shilcock, of Hitchin, was selected, and that gentleman has been instructed to procure tenders for the works.

IVERNESS.—The late Mr. Grant, of Bught, left a legacy of £5,000 towards building a new Town Hall for Inverness, provided such were done within five years after his death. The Town Council have frequently had the matter before them, and it was at length resolved to invite designs from the local architects for the new buildings, at a cost not exceeding £12,000. Four architects have entered the competition—these being Mr. Alexander Ross, Mr. Lawrie, Mr. John Rhind, and Mr. Wm. Mackintosh, the plans being sent in under mottoes. The plans were opened the other day in presence of the Council and Mr. Grant's trustees, and on Tuesday the public were admitted to inspect them in the present Town Hall. The site of the proposed new Town Hall is that on which the present one stands, and some contiguous properties have also been acquired.

MAIDENHEAD WATER SUPPLY.—The Town Council of Maidenhead, no doubt fully aware of the great necessity there existed for having a proper supply of water for the general requirements of the town, determined last summer to make the necessary provision, and in July last an advertisement appeared offering a premium of £25 for the best plan. Some eight or nine hydraulic engineers entered into competition and submitted to the Council their plans, estimates, &c.; this number was afterwards reduced to two for final selection, viz., Messrs. Gotto and Beasley, of Westminster, and Mr. E. Pritchard, of Warwick, and at a meeting held on the 4th Dec., the Town Council awarded the premium to Messrs. Gotto and Beasley. As reported in the local paper, it was stated at the meeting referred to, alluding to Mr. Pritchard's plans—"that but for one or two points" the preference would have been given to that gentleman's scheme. The following resolution was unanimously passed, viz.:—"That the thanks of the Council be presented to E. Pritchard, Esq., C.E., Warwick, for the very excellent plans which he prepared and presented for the proposed water works for this borough."

THE MARGATE DRAINAGE COMPETITION.—A special meeting of the Margate Town Council took place on Tuesday week to consider the desirability of seeking a conference with the competing engineers; to rescind a previous resolution of the Council refusing the award of the second premium to the author of "C.E."; and to open the plan sent by "C.E." in June last. Mr. Sear, in a lengthy speech, proposed a resolution to the effect that the amended plan did not satisfy the Council, and this was seconded by Mr. Hermitage. Mr. Sear, after some discussion, amended the motion as follows:—"That the amended plan sent in by Mr. Angell does not satisfy the Council, and is not such as the Council feel justified in forwarding to the Local Government Board for approval." An amendment was moved to the effect that the amended plan be sent to the Local Government Board for approval, but the original resolution was carried by eight votes to four. It was ruled that the question of rescinding a previous resolution of the Council, refusing the award of the second premium to the author of "C.E." could not be entertained at



that meeting, and the matter therefore fell through. On the notice of motion to open the plan of "C.E." it was moved and seconded "That the amended plan of 'C.E.' be unsealed and laid on the table for inspection by the Council." The Mayor said he would tell them just how the case stood. On the 30th of March the town clerk was instructed to issue a notice that the plans would be open to public inspection for fourteen days from that date until April 2nd. On the 16th of June, when these plans had been open to all, they had sent in this amended plan of "C.E." What greater acknowledgment of a defective plan could there be than by sending in an amended plan? He argued that they should not allow "C.E." this privilege without allowing others the same. This plan was sent in, probably, after having sucked the brains of all the other competitors. How could they do this with justice to the other engineers? After some discussion, the motion was withdrawn. Sir Joseph Bazalgette sent in his account as referee on the drainage plans—£105 according to agreement, and an additional £5 for travelling and incidental expenses—total, £110. No action was taken upon this letter.

#### ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETIES.

**NORTHERN ARCHITECTURAL ASSOCIATION.**—An ordinary meeting of the above Association was held on Tuesday night; the chair was occupied by the president of the society, Mr. M. Thompson. Mr. Frank Rich, Mr. W. L. Newcombe, and Mr. J. H. Robinson, were nominated Associates. The President read a paper on "The Present Position of the Society," for which he was awarded a hearty vote of thanks. The following gentlemen were elected to fill the various offices of the Association for the ensuing year:—President, Mr. John Johnson; vice-president, Mr. T. Prosser; treasurer, Mr. W. H. Dunn; secretary, Mr. T. Oliver; solicitor, Mr. G. W. Hodge; Committee: Mr. M. Thompson, Mr. Gibson Kyle, Mr. J. Hogg, Mr. W. Peachy, Mr. G. Connell, Mr. F. Charlton, Mr. J. W. Shotton, and Mr. T. Rea.

**SOCIETY OF ANTIQUARIES OF SCOTLAND.**—The usual monthly meeting of this Society was held at Edinburgh on Monday night. The Chairman announced that the Council of the Society at its last meeting had appointed Dr. Arthur Mitchell, the senior vice-president of the Society, to be the Rhind lecturer on Archæology in connection with the Society of Antiquaries of Scotland. The first paper read was an account, by Rev. James E. Gillespie, of Kirkcubright, of the discovery of a canoe in the loch of Lotus, now presented to the Society by Mrs. Hyslop, of Lotus. Dr. John Alexander Smith read a notice of a collection of flint weapons from the neighbourhood of Fordun, Kincardineshire, a corresponding member of the Society; also a curiously-carved stone ball, found in the same locality. Dr. Smith was also enabled to exhibit five of these rare and curiously-carved stone balls formerly in the collection of the late Joseph N. Paton, of Dumfermline, long a Fellow of the Society. Mr. Anderson, keeper of the museum, read a notice regarding a small figure in jet which had been obtained at Florence. Nothing was known of its history, but Mr. Anderson was now able to identify as a *signaculum* of St. James the Greater (St. Jago di Compostella), probably worn by a leprous pilgrim to that famous shrine. The figure represents St. James in the garb of a pilgrim, with staff and wallet, holding in his left hand the book of the Gospel, significant of his character as an Apostle. An image of jet, precisely similar to the one presented by Mr. Gibson-Craig, had been dug up at the Chapel of the leprous pilgrims at Einsiedeln, in Switzerland, thus connecting these *signacula* with leprosy, while the attribution to St. James was established by comparison with the figures of the Saints as he appears in pilgrim's garb on several East-Anglian road-screens. In conclusion, Mr. Anderson noticed the forgeries of pilgrims' signs in lead, of which a number were exhibited.

#### ARCHÆOLOGICAL.

**RECENT DISCOVERIES AT POMPEII.**—The Naples correspondent of the *Athenæum* writes:—"I have already sent you a brief notice of an important discovery made in Pompeii at the beginning of last month. Fuller details are now

in my possession of this well-preserved and beautiful work of art, which well deserve to be recorded. The excavations are being made in the centre of the city, in the Strada Stabiana, leading to the Gate of Vesuvius, which is still underground; and it was at the eastern corner of this street, south of the Strada Nolana, that the fresco in question was discovered. Orpheus, seated on a rock by the side of a lake, is amusing himself by playing on a lyre. Many animals are running to listen to him. A panther has taken a seat on his left, and with open mouth, and a face expressive of wonder, is listening attentively. On the other side a lion, extended at full length on the ground, has changed his usually fierce expression for one of mildness; below his paws are a stag, a wild boar, a hare, an ibis, a stork, whilst two ducks are swimming rapidly across the lake, as if to approach Orpheus; above, on either side of the painting, are a panther, a leopard, tigers, cattle, and other animals. Not the least surprising feature is an eagle, in the midst of this assembly, holding a rabbit in its talons, but which he has ceased to devour, so charmed is he by the attractions of the music. On each side of this fresco is a picture representing birds, arabesques, flowers, and fruit-trees. So much for the subject. As to critical observations, the wall itself is about 7 metres in length and 5 in breadth. The beauty of Orpheus surpasses all description, especially the head, which is covered with curly locks; the face is cheerful, and full of the fire and vigour of youth. Amongst all the discoveries made in Pompeii this subject is unique, and whilst it is most interesting to art from its exact representation of life, it is equally so to archaeology."

**THE PALESTINE EXPLORATIONS.**—Lieut. Conder, R.E., the officer in charge of the Survey Expedition, reports important discoveries of ruins in the Hill Country of Judah, which he proposes to identify with some of the lost Biblical cities and sites. Among these are Chozeba (1 Chron. iv. 22), now called Khirbet Kueizibeh; Maorath (Joshua xv. 58), the position of which appears marked by a name which survives at a certain point, the Wady-el-Moghair, or Valley of the Cave; Arab (Joshua xv. 52), of which all that is known is that it was one of a group round Hebron. A ruin has been found called Khirbet-el-Arabiyyeh, in which the old name seems preserved with a modernised signification. Zanoah (Joshua xv. 56, and 1 Chron. iv. 18), which lay apparently between Juttah and Cain, is identified with Khirbet Sanut, a ruin lying very near the ancient Cain. Lieutenant Conder finds also near the spot where the "Forest of Harith" has been always placed, a ruin bearing a name Kharas, in which the essential letters of Harith are still found; it is remarkable that the "Forest" of the Authorised Version appears in the Septuagint and Josephus as the "City." Again with regard to the "Wood of Ziph," whither Jonathan went to meet David, Lieutenant Conder thinks that there could never have been any wood at all in this district, now absolutely treeless. He has discovered, however, a Khirbet Khorreisa in which the Hebrew Chores, translated as the wood, seems to be preserved close to the undoubted site of Ziph. Here again we must remember that the Septuagint substitutes for the "Wood of Ziph," the "New Place." He thinks, too, that he has found the "Rock of Maon," to which David "went down," in the "Valley of Rocks;" the Hill of Hachlah, where one of the dramatic episodes in the life of David took place, and the Cliff of Ziz, for which he proposes a site very far from that indicated by previous explorers. He has also been engaged in a search for the limits of the Levitical towns, hoping to find some inscription or monument similar to that which rewarded M. Ganneau on the site of Gezer. He has not found any Hebrew inscription, but appears to have discovered boundary stones which may prove to be the ancient Levitical landmarks.

Mr. J. P. Seddon has been commissioned by the committee of the Welsh University College, Aberystwyth, to prepare plans for the completion of the building at once.

The parish-church of Crowle, Lincolnshire, is in a worse condition than any church in the country. The old-fashioned pews are all tumbling down, and although varnished brown, are actually repaired in many prominent places by pieces of white unpainted and unvarnished deal! The floor-covering of the chancel and isle is rotting with damp, and the walls and windows are smothered in mould and dirt.

## Building Intelligence.

#### CHURCHES AND CHAPELS.

**CHATHAM.**—On Tuesday week a meeting of the committee for promoting the restoration of St. Bartholomew's Chapel, Chatham intra, was held, the Dean of Rochester presiding. The report was prepared by Sir Gilbert Scott, who had inspected the chapel, which dated from 1078, in which year it was built and founded by Bishop Gundulph, the builder of Rochester Cathedral and Castle, and the Tower of London. Sir Gilbert Scott described the chapel as well worthy of restoration, as a considerable portion of the original Norman structure still remained. The plans for the restoration of the building were laid before the committee. The work of restoration will involve an outlay of about £2,000.

#### BUILDINGS.

**BUXTON.**—For some time past the Buxton Building Company, Limited, have had under their consideration several important schemes for the alteration and improvement of the structure known as the Pavilion. Four plans were submitted, as follows:—No. 1. Widening and extending the central hall, giving 350 extra seats, at an estimated cost of £2,000. No. 2. Widening the wings, at a cost of £2,500. No. 3. The erection of a concert-hall on the site of the west conservatory, to seat 1,000 persons, and 800 more with the addition of a west wing, to cost £3,000; and, No. 4. The erection of a splendid music-hall, to seat 1,800 persons, at a cost of over £6,000. On Tuesday there was an extraordinary meeting of the shareholders on the subject, when the whole question was taken into consideration. It was decided to increase the nominal capital of the company to £20,000, and at as early a period as possible to £25,000, for the purpose of enabling the company to carry out such a scale of improvements at the Pavilion as to render it a largely increased place of attraction to the visitors. Of the four schemes submitted for a commencement, No. 1 was unanimously adopted.

**NEW VESTRY HALL FOR ST. CLEMENT DANES.**—On Wednesday the memorial-stone of the new Vestry Hall for the parish of St. Clement Danes, now in course of erection by Messrs. Thorne and Co., of Chelsea, from the designs of Messrs. Codogan and Butler, was laid. The new building is intended to replace the old Vestry Hall, removed to make room for the new Law Courts, and its estimated outside cost is £7,000. It will be in the Italian style, of Portland stone, relieved with columns of polished Aberdeen granite, the main front comprising two stories and a basement. The vestry-room, on the first-floor, will measure 38ft. 6in. by 28ft. 6in., and ample accommodation in the shape of offices, committee-rooms, &c., will also be provided.

**RHYL.**—The foundation-stone of the New Town-hall at Rhyl was laid on Tuesday. The design for the building was obtained in competition from Messrs. Wood and Turner, of Barrow-in-Furness. In the centre of the block, and facing Wellington-road, will stand the clock-tower, 15ft. square above the base and 160ft. high, and beneath this will be the principal entrance to the market. The assembly-room will be 79ft. long, 40ft. wide, and 29ft. high, the ceiling being placed at the collars and panelled with stucco ribs. The tower walls and the main building will be constructed of Denbigh stone, faced with Penmaenmawr sets, the dressings and groins being of Wrexham stone. The remaining portion of the walls will be executed in brickwork. The amount of the contract, which has been let to Mr. J. Rhydwyn Jones, contractor, Rhyl, is about £6,000.

#### SCHOOLS.

**BROMSGROVE.**—New schools are about to be erected at Leikley End, Bromsgrove. The committee have approved of the plans of Mr. John Cotton, architect, Birmingham. There will be a girls' schoolroom, 51ft. by 17ft.; an infants' schoolroom, 42ft. by 20ft.; a classroom, porch, necessary out-offices, and a playground, the accommodation being for upwards of 200 children. The building will be of red brick, with slated roof. A contract has been entered into with Messrs. Brazier and Weaver, Bromsgrove, to erect the buildings for £600, being less than £3 per child; but the contract does not include school-fittings, boundary fence or wall, and draining, levelling, and graveling the playground.



**NEW SCHOOLS AT LICKEY END.**—A recent meeting of the School Committee have settled the contract for the new schools, to be erected at the Lickey End. The plans, prepared by Mr. John Cotton, architect, of Birmingham, were examined and approved. They provide accommodation for upwards of 200 children, and comprise a girls' schoolroom, 51ft. 3in. long by 17ft. 3in. wide, and an infants' room, 42ft. long by 20ft. wide. There are also a classroom, conveniently situated adjoining the schoolrooms, a porch, and the usual out-offices, which are placed in the rear part of the playground. The tender of Messrs. Brazier and Weaver, builders, who had offered to carry out the work for the sum of £600, was accepted. The building, which will be forthwith proceeded with, will be erected of red brick, with 14-in. main, or outside wall; the roof will be slated, the ceilings plastered, and the walls coloured inside (the lower part of same being painted). The schools, although plain, will be neat and substantial. Considering that statistics show Board Schools to have cost, where erected, sums ranging from £6 to £10 or £12 per child, it is satisfactory to know that the Lickey End Schools will illustrate a more economical method, as they will cost under £3 per head; it is well, however, to bear in mind that the contract does not include school fittings, boundary fence or wall, and draining, levelling, and gravelling the playground.

#### CHRISTMAS DAY.

The next number of the BUILDING NEWS will be published on Thursday, Dec. 21. All advertisements must reach the Office by Five p.m. on Wednesday next.

#### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions to our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

**TO OUR READERS.**—We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

#### ADVERTISEMENT CHARGES.

The charge for advertisements is 6d. per line of eight words (the first line counting as two). No advertisement inserted for less than half-a-crown. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front Page Advertisements 9d. per line.

Advertisements for the current week must reach the office not later than 5 p.m. on Thursday.

#### TERMS OF SUBSCRIPTIONS.

(Payable in advance).

Including two half-yearly double numbers, One Pound per annum (post free) to any part of the United Kingdom, for the United States £1. 6s. 6d. (or 6 dols. 40c. gold). To France or Belgium, £1. 6s. 6d. (or 3 francs 60 centimes). To India (via Southampton) £1. 16s. To any of the Australian Colonies, New Zealand, the Cape, the West Indies, Canada, Nova Scotia, or Natal, £1. 6s. 6d.

N.B.—American and Belgian subscribers are requested to remit their subscriptions by International P. O. O., and to advise the publisher of the date and amount of their remittance. If the last-mentioned precaution is omitted, some difficulty is very likely to arise in obtaining the amount. Back numbers can only be sent at the rate of 10d. each, the postage charged being 6d. per copy. All foreign subscriptions unaccompanied by an additional remittance to cover the extra cost of forwarding back numbers are commenced from the next number published after the receipt of the subscription.

Cases for binding the half-yearly volumes, 2s. each.

Subscribers receiving their copies direct from the office are requested to observe that the last number of the term for which their Subscription is paid, will be forwarded to them in a coloured wrapper, as an intimation that a fresh remittance is necessary, if it be desired to continue the subscription.

RECEIVED.—J. E. A. G.—B. D. and H.—C. B. A.—J. H.—S. E. F.—J. D.—W. W.—G. S. C.—E. and W.—J. P. S.—J. Shipley.—Hy. Pratt.—Philip H. Harrison.—W. D. Shelton.—H. G. White.—Miss White.

SMITH & FRODRICK (Photo. to hand).—W. G. SHREUBSOLE (Drawings to hand).—INVENTOR (Your suggestions as to a "tunnel" and "aerial navigation" are splendid—in fact too splendid by half, we fear, to be of any practical use in the world).—A. LAUPER (Drawings to hand).—S. C. FARR (Photograph to hand).

## Correspondence.

### A SCIENTIFIC AND SAFE WATER-CLOSET.

(To the Editor of the BUILDING NEWS.)

SIR,—Your correspondent, Mr. Duffield, is quite right, and Mr. W. P. Buchan wrong. I would recommend the latter gentleman to learn a little of the principles of sanitary science before setting up as a teacher, and a few years in a London plumber's workshop would be of use to his inquiring mind.

The old-fashioned pan-closet and the air-pipe and mode of ventilation are as old as the hills, gas-pipe and air-pipe included. The only point in his scheme is the discharging into the gully-trap, and this is useless, as there should be a free play of air under and around end of soil-pipe to keep the sewer gas from ascending (and which of us would like the soil discharged on top of a gully-grating?) the soil-pipe, and so ascending into the house.

Sewer-gas, luckily for us, is a heavy gas, and will not force a water-trap without sufficient pressure of wind or air seeking to reach the higher temperature of our dwellings, and my practical experience teaches me that whenever the temperature in the sewer is low the greater the danger of the trap being forced, and then the only protection is a good valve-closet.

Your correspondent, T. C. Sorby, seems to have confounded the sanitary pan and siphon-trap closet with the pan. His remarks apply to the first named, and are very good and to the point, with this difference, that the closet should work by pulsations. The first pull of the handle sends enough water to clear the soil and urine, but the paper is left in the trap and the soil that has clogged same. We want a second self-acting motion at an interval of say four minutes (when the paper is soaked) to wash out the trap; and the man that first invents a closet of this kind will do more for health than all the doctors. I think this should not be above our intelligence to invent this simple time action, hydraulic if possible, as a plumber is not a machinist.

If any of your readers, while taking his morning meal, will pour the coffee-grounds into a saucer, and then holding it by one finger and thumb tilt it into the slop-basin, he will have a good idea of the action of a pan-closet and the way the soil is splashed about the filthy container. Every time the handle is lifted there is a fresh deposit.

Plumber's apprentices know this too well; but it is still recommended "for the good of the trade." Supplement this with a filthy D-trap (dear to the heart of a plumber), and you have one of the dirtiest apparatuses within the house you could wish.

Will no spirited manufacturer give us glass water-closets, traps, soil-pipes, and cisterns, and water-pipes too, and train a few men to use the blow-pipe and gas to join them. After seeing the tanks in the Brighton Aquarium, I am tired of the 6lb. lead sides and 7lb. bottoms I have had to specify, and am not inclined to believe the old story "It won't do." Builders are a progressive race, and I hope these remarks may give some one a hint that has more time to develop it than yours, &c.

ROBERT PHILLIPS.

### SAFE WATER-CLOSETS.

SIR,—Mr. W. P. Buchan no doubt feels that his mode of fixing water-closets is quite new to the public, and I am quite willing for him to continue to do so.

But I hope he will pardon me referring to his sketch in the BUILDING NEWS of November 27. He describes his 3in. lead pipe from water-closet trunk leading into the open air as important. This may be so, but as soon as I perceive that he connects the dribble-pipe into the closet siphon, I must say that he kills his theory at one blow. I beg to inform him that the dribble-pipe should be carried through the wall: this I consider the safest way. In some cases where the closets are in the centre of buildings, I have found it necessary to connect the dribble-pipe from lead safe to lead siphon trap; but I have always made a siphon of the dribble-pipe, and I have always provided a small dribble from valve of closet to dribble-pipe in lead safe in such cases, so that whenever the handle of the closet is pulled up about a wineglass-

ful of water is conveyed into the dribble-pipe in lead safe: this prevents it ever getting dry.

Ebley.

J. W. DAVIS,

### PULPITS.

SIR,—I am glad my query has elicited a reply from so good an authority as Mackenzie E. C. Walcott. The instances he gives are few. May I further ask him whether the same corbelled treatment of pulpit exists at the places he mentions that is seen at Beaulieu? The old monks were thus far strict economisers of time, and a lesson here may profitably be learnt at our own boards. There is a great deal of time wasted at our dinner-tables, and the profitable habit of eating *audita sacre Lectionis* may be usefully taken advantage of. Our restaurants and eating-houses might even avail themselves of good readers if not musicians. G.

### NEW SHOREHAM CHURCH.

SIR,—On Saturday last I was at New Shoreham Church, Sussex, which is so well known to all interested in English architecture. The east end in composition and detail is especially beautiful and unique, and it is now, I found, in process of so-called "restoration." The work is being carried on in the following manner:—The whole of the ashlar face has been rubbed and partially tooled, thereby entirely removing the hard grey weathered surface lichen and ancient tool-marks.

All mouldings, arches, shafts, carved capitals, &c., have been well rubbed to a new smooth white face, and decayed and broken stones and mouldings have been "made good" with dark Portland cement. The joints to the ashlar and flint work have been tuck-pointed, except in some places where the flint work has been covered with a smooth surface of cement jointed in imitation of stone.

The remains of the tracery in the wheel window of the gable, though in a more or less perfect state, have been removed, and entirely new tracery inserted. When I tell you, sir, that the work is being done by a local bricklayer, without any professional direction, you can easily understand how it is that the work should have been carried on with such disastrous results.

The well-intentioned gentleman at whose cost I was told the work is being done has led the workman into the errors which I have described, through a mistaken desire for spic and span smoothness which at one time, as in the case of the west front of Lincoln Minster, brought about such havoc in our old churches.

Possibly further destruction may be wrought at this fine church. Although the whole of the really ancient workmanship of the east end has been already obliterated, yet it is not too late to rescue the rest of the building from similar treatment; and I trust that some one connected with the church will awaken to a sense of the duty of preserving it from further injury.

Though no person in Shoreham or its neighbourhood appears to have protested against the manner in which the work is being done, surely one would have at least expected the proper guardians of the church would not have permitted this work of Vandalism.—I am, Sir, &c.,

HENRY JARVIS, JUN.

29, Trinity-square, London, S.E.,  
15th Dec., 1874.

### INSTITUTE CONDITIONS FOR THE SOANE MEDALLION.

SIR,—In the conditions given by the Institute for the Soane Medallion is the following:—"A London residence at the corner of a street, and adjoining houses of a corresponding character and plan, with a frontage of 50ft. and depth of 120ft." Now, the planning of a house depends, of course, on its position; what is excellent on one site becomes bad on another. Therefore, to make a corner house correspond with another of only 50ft. is questionable, and I think the Council of the Institute ought to give an explanation for intending competitors.—I am, Sir, &c.,

Dec. 16, 1874.

ONE OF 'EM.

At Kearsley, between Bolton and Manchester, the main sewer burst last week and flooded a large portion of the town.

Messrs. Cox and Sons have purchased, at the sale of the South-Eastern Works, Ramsgate, a large portion of the stock of furniture similar to that used at the Granville Hotel, designed by E. Welby Pugin, Esq., architect, as also the collection of photographs and working patterns.



# Intercommunication.

## QUESTIONS.

[3599].—**Reclamation of Land.**—A New County.—On looking over some old journals the other day, I saw an account of a movement which was on foot at that time (about 1856) to form a new county from the lands which were being left by the sea as it receded. This was on the coast of Lincoln and Norfolk, and the new county was to be called Victoria County. Can any reader tell me whether anything was done in the matter? Of course, I know the county was never added, but I should like to know what steps were taken in the matter.—**INQUIRER.**

[3600].—**Preservative Paints.**—Is the "indestructible paint" a good protection for stonework? What is the "Torbay," or red oxide, paint? Is it a good coating for ironwork; and what is its composition?—**BUILDER.**

[3601].—**Wrought Iron.**—How is the weight of wrought iron in plate determined?—**TYRO.**

[3602].—**Slatings.**—Can any one inform me how to measure hips and valleys of an irregular roof. It is octagonal in plan, having eight hips.—**RESPICE FINEM.**

[3603].—**Joists.**—What weight will a red pine joist safely carry 20ft. long 12in. by 3in.? Will some one kindly inform me?—**POM COLLINS.**

[3604].—**Form of Agreement.**—Will some kind reader give, through this Column, for the benefit of myself and others, a good form of agreement between architect and builder, suitable for all ordinary cases; also what paper must be used to make it legal?—**FEBUS.**

[3605].—**Rock-drill and Dynamite.**—Can any subscriber give me the name and cost of any improved rock-drill, to be worked by steam or hand, suitable for a hard grit or sandstone? Is there any safer and more effective material than blasting-powder to be used in the neighbourhood of dwellings? How is dynamite used? Will it explode under water?—**QUARRYMAN.**

[3606].—**Air-tight Windows.**—I have some large squares of plate-glass to place in the openings of windows when the stone jambs and mullions are prepared with a groove for their reception. It is a *sine qua non* that they be made perfectly air-tight, by some stopping in the grooves, which shall accomplish that object and yet not become so hard as to render the glass liable to break through concussion of the air or other pressure. Can any of your readers oblige with a hint on the subject?—**CONSTANT READER.**

[3607].—**Saddle-backed Roofed Towers.**—Can any of your readers refer me to ancient examples of saddle-back roofed church towers in England? Abroad they are to be met with, but I cannot call to mind any instances at home, though there may be some.—**M.**

[3608].—**Oblique Arches.**—Can any one explain the principles of these, and the obliquity they may have? What is the "heading spiral"?—**STUDENT.**

[3609].—**Field's Flushing Tank.**—As named in BUILDING NEWS, Oct. 16, 1874, p. 476, No. 2,495.—Will some one kindly give sketch showing how the siphon is placed, so as to be self-acting when the tank is full?—**L.**

[3610].—**Hydraulics.**—Will your late correspondents on hydraulics give me the benefit of their experience on the following questions:—What would be the loss of head in a 2in. diameter lead siphon about 300ft. long, the highest point *c* being 20ft. above level



of water, and the point of delivery B 5ft. below the surface of the water to be drawn off at A, the water to rise perpendicularly to the highest point, and afterwards a gradual fall to the point of delivery? What is the best mode of working a siphon? If, with a stop tap at each end, the pipe is filled with water at the highest point and then both taps opened simultaneously, would the siphon act? or require a hand air-pump or sucker at the lowest end to extract the air in the pipe? Could a siphon be made to act under the above conditions satisfactorily, and would it work until the water to be drawn off was as low as the point of delivery? Would a siphon act with a less difference in level than 5ft?—**QUARRYMAN.**

[3611].—**Snow-boards.**—Will Mr. W. P. Buchan, or any other correspondent, give me some information respecting the above? A sketch showing method of fixing will oblige.—**H. R., Clapham.**

[3612].—**Water in Pipes.**—Can any one give me a formula for finding the loss of head due to friction, or the fall required to convey water through pipes?—**LEARNER.**

[3613].—**Cement.**—How many yards will one cask of Portland cement cover three-quarters of an inch thick?—**READER.**

[3614].—**Slatings.**—Can any reader inform me the kinds of slates in the market, and their sizes and weights per square?—**STATISTICAL.**

## REPLIES.

[3530].—**Hydraulics.**—W. P. Buchan has not rightly understood my remarks. I did not anywhere say that water, with a pressure of 6ft., would refuse to flow through a pipe 6ft. long. If he refers to my reply, he will see that I alluded to the contracted outlet of three-quarters of an inch, which he asserted increased the outflow. He does not answer the case of "N. A. H.'s" cistern remaining empty, while he practically ignores friction altogether. Perhaps W. P. B. can tell me how much loss of lead there would be in a pipe 2,000ft. long and 8in. diameter, the velocity of the flow being 3ft. per second.—**G. H. G.**

[3530 and 3582].—**Hydraulics.**—I would recommend your correspondent to buy a shilling book on Hydrostatics. The pipe having a fall of 6ft. would lift the same weight of water—less 15lb. pressure to the super. inch—its own height. The velocity and decrease in volume would overcome the friction. The larger the pipe at the inlet and the smaller at the outlet, the greater the height the water would be raised.—**ROBERT PHILLIPS.**

[3563].—**Ancient Lights.**—If "M. G.'s" reply is intended to be in partial contradiction to mine contained in your issue of 25th ult., I would advise whoever asked the question to get Professor Kerr's "Ancient Lights," in which the legal decisions are quoted as the authorities for the statement that, under some circumstances therein mentioned, ancient lights can be extended. There is no legal right to have the new or extended portion of such lights unobstructed; but the extension of an ancient window does not lessen the right to unobstructed light through the ancient portion of it; and practically it is in most cases not practicable for a neighbour to obstruct the new portion of the window without damage to the light through the old. Always recollect, in dealing with these questions, that it is not the right to make windows that has to be discussed. Any one has the right to break a window through a wall, so as to overlook his neighbour's land, and receive light to it immediately from his neighbour's land. The real question is, what right has the neighbour to obstruct? In the case of windows not "ancient" he may obstruct, and in the case last mentioned, completely hoard up a window within 20 years of its being made; after that it becomes "ancient;" but in so hoarding up he must entirely support his hoard from his own land or walls.—**L.**

[3568].—**Measuring Mason's Work.**—The series of articles on Quantities in the BUILDING NEWS, which appeared some few months ago, may be consulted with advantage. The subject of mason's measurement for labour is certainly a little confusing to the young surveyor, and seems to admit of a very profitable discussion in the Intercommunication columns of the BUILDING NEWS. The local customs of measuring also vary so greatly that if each locality's practice were given, some agreed mode of taking mason's work founded on the best system used would probably be adopted before long—a result much to be desired in the interests of architects' and surveyors' education, for I do not see that local conditions in such common-sense matters should impose varying rules of measurement for labour, unless some decided divergences of working stone existed at the same time. Ancient the question of mason's work, carpenter's "quantities," also are differently taken in different parts, so also are plasterer's, bricklayer's, and nearly every other trade. The Intercommunication of the BUILDING NEWS seems to be just the ground and place whereon to open a discussion on fair and just modes of measurement. I shall be pleased to take part in such a discussion, and I am sure it would be far more practical and useful than half the discussions and papers at the Institute and Association, and the benefits far greater and more permanent. Each contributor would be addressing, not a mere handful of members, but the profession throughout the kingdom, and even beyond its shores, while the listeners or readers would be men of all classes, theoretical and practical, and occupying various localities and positions.—**G. H. G.**

[3579].—**Deduction.**—As follows.—100ft. 3in. lead piping; 50ft. 3in. lead piping; 75ft. 1in. lead piping. Leading, 25. If any of the above was put in, the contractor is certainly entitled to the leading, or the same in proportion to the amount put in; if half, 50s.; if more than the above, add the excess in the same proportion.—**BUILDER'S CLERK, Bradford.**

[3580].—**Contingencies.**—There is, perhaps, no contributor to the pages of the BUILDING NEWS whom I respect more than "G. H. G.," but, in respect of contingencies, his answer and mine, last week, were wide as the poles asunder. Since our contradiction of each other, permit me to trespass a little deeper into the subject. In the Midland Counties and elsewhere (my friend F., who put the question, hails from Manchester), a clause similar to the following heads the specification:—"Include in contract the sum of £— for contingencies, to be deducted if not required." The quantity surveyor will sometimes tack on the amount at the end of his bill, thus: "Contingencies,

£—." Put into plain English, the meaning of this provision is that, in a hurried specification, or in a complicated work, the architect may have slipped certain incidentals absolutely necessary for the perfect completion of his building; and out of this amount of contingencies he is enabled to instruct the builder, without at the same time making himself appear incompetent in the eyes of his client. The matter is entirely under the control of the architect, and he may with impunity increase it to any amount, or omit it altogether. How, therefore, can it be called the property of the builder? "G. H. G." says the builder may claim it as a risk, but the assertion will not bear a moment's investigation. When a merchant or a tradesman agrees to supply so many tons of coal or yards of calico, or doors, or windows, or stones, or papers, at certain fair prices, is he to charge so much for risk? The thing is unheard of in a commercial community where honour and profit are studied together. The price is supposed to be sufficient to cover every risk. The builder has before him the exact quantity and character of the work required to be done. He knows the price at which such work can be done, allowing a fair margin for risk and profit. He has no right to expect any more. If the amount for contingencies were awarded him, the consequence would be that it would never again appear in a specification. "G. H. G.," says he thinks it may be reclaimed by a builder in a court of law. Perhaps so, remembering how uncertain that process is; but will "G. H. G." give us an argument in its favour, or quote a precedent in its support?—**H.**

[3582].—**Hydraulics.**—The simplest reply to "Live and Learn" is that the water rises higher from a pipe when contracted at its immediate orifice, because for the amount of water emitted there is a proportionately less retardation by friction and capillary attraction than there would be if the water spouted out of an uncontracted pipe. From the same cause the amount of water emitted from the contracted opening would be greater in proportion to the size of the opening than from the orifice of the uncontracted pipe. W. P. Buchan's answer is quite right, but he fails somewhat from want of perspicuousness in his writing, which I always read with interest, and because of the interest with which I read it, I the more earnestly desire that he would carefully read his lucubrations before investing them with the dignity of print.—**R.**

[3582].—**Hydraulics.**—On page 711, thirteenth line from foot of mid-column in "consequently the larger pipe can run off nine-tenths as much as the smaller one," read "nine times," not "nine-tenths."—**W. P. BUCHAN.**

[3588].—**Ventilation for Weaving-shed.**—The best system of ventilation I know of is one now being largely used in this neighbourhood, viz. "Potts' Patent System," which seems to give good ventilation without draught.—**G. P. DUMCALF, Great Britain Company, Macclesfield.**

[3591].—**Cement Bricks.**—The simplest mode of mixing the ingredients for concrete bricks is to mix them with shovels, wetting them with water under pressure passed through a pipe with a rose end to it and then to pass them through a pugmill with an Archimedean screw at the bottom, and a mixing pan at the top. The presses may be fed by hand, and worked by hand; but it is better to work them by machinery, as the bricks require a considerable pressure. I shall be happy to supply your correspondent with drawings and specifications for a concrete brick works if he requires them. Scientific cement will answer very well instead of Portland cement, if used in the proportion of 1 cement to 6 sand.—**CHARLES TURNER.**

[3593].—**Tiling.**—The number of plain tiles required for a square will vary according to the gauge adopted, thus—600 tiles will cover a square at 4in. gauge; 700 tiles will cover a square at 3½in. gauge; 800 tiles will cover a square at 3in. gauge; and 210 tiles will cover a square laid flat. A square of plain tiling requires 3 hods of mortar, 1 peck of tile pins, and one bundle of laths.—**W. H. C., Stafford.**

[3593].—**Tiling.**—See "Hurst," page 198. Plain tiles, 10½in. by 6½in. by 3½in.; 4in. gauge, 600, with 3in. gauge, 800; laths (5ft. long), 1 bundle; 1½ hundred of nails, 1 peck of tile pins, and 3 hods of mortar to the square.—**B.**

[3593].—**Tiling.**—A square of plain tiling requires if laid to a 6in. gauge, 800 tiles; 7in. gauge, 700 tiles; 8in. gauge, 600 tiles. One bundle of laths, 1lb. of nails, 1 peck of tile pins, and 3 hods of lime and hair.—**H. L. G.**

[3596].—**Tiling.**—There are 600 plain to a square at 4in. gauge, 700 at 3½ gauge, and 800 at 3in. gauge. To one square of tiling, 1 bundle of laths, 1½wt. of nails, and 3 hods of mortar are required.—**G. H.**

[3594].—**Cube Brickwork.**—A very simple rule is to deduct one-ninth from the cubic contents for the standard thickness.—**G. H. G.**

[3594].—**Cube Brickwork.**—A student asks to be informed the way to reduce cube brickwork to standard measure. The way is, multiply the cube quantity by 8, and divide that product by 9, will be equal to standard (14in. reduced) brickwork.—**JAS. SHILLOCK, Hitchin.**

[3594].—**Cube Brickwork.**—Multiply by 8, and divide the product by 9, will give the number of superficial feet standard thickness; this must be divided



again by 272 to ascertain the number of rods. "Student" will, probably, understand the reason of the rule, upon seeing that 12in. is 8-9ths of 13½in.—B.

[3596.]—**Chilmark Stone, Wilts.**, is a siliceous limestone, remarkable for having a large quantity of silica in its composition. Weight about 143lb. per cube foot; will bear a tensile strain of 500lb. to the square inch, and a crushing weight of 196 tons to the foot super.—T. P. LILLY, Tisbury Quarries, Wilts.

[3597.]—**Hydraulic Cement.**—Portland Cement is made of 5 of chalk to 2 of clay; but the clay should contain a large proportion of sand or silica, chemically united with the alumina.—CHARLES TURNER.

#### STATUES, MEMORIALS, &c.

**MEMORIAL TO THE LATE MR. WILLIAM RATHBONE.**—In 1868 it was resolved to erect a statue of the late Mr. William Rathbone. About £3,700 was raised, but it was not until last year that Mr. Foley was instructed to prepare a model. This was accomplished before Mr. Foley's death, and all who have seen the model speak very highly of its faithfulness. The committee have resolved to have the statue executed in Sicilian marble, and placed in the eastern circle of Sefton Park. A canopy will be erected over the statue to protect it from the effects of the weather.

**THE BECKETT MEMORIAL.**—It is announced that the memorial to the late Sir Edmund Beckett is, at the request of the family, to take the form of a canopy to protect a statue which will be provided by the children of the deceased baronet. The commission for the statue, it is stated, has already been given to Mr. Noble.

#### WATER SUPPLY AND SANITARY MATTERS.

**BARNSELY.**—The Barnsley Town-Council decided on the 9th inst. to adopt Mr. Bailey Denton's system of treating sewage. Mr. Bailey Denton's report on the subject was read at the meeting of the Council on Friday last. He states the area of the borough to be 2,400 acres of which 660 acres may be expected to be covered with roads and buildings within the next 30 years. He then continues by giving the population at present, and its increase since 1801. The present number of houses is 4,600, and waterclosets 350. The daily sewage is 75,000 gallons, which in 30 years would be 150,000 gallons. He recommends the surface water to be divided from the sewage, the restoration of water-courses—now used for sewage purposes—to their original uses, states the rainfall for the past three years, and suggests provision for storms, overflows, road detritus, sludge, and trade refuse. To take the sewage from the town he proposes to construct outfall sewers from Hoyle Mill to tanks situate below Grange Mill, previous to its being applied to land. As notice has been given to purchase 100 acres of land, Mr. Denton recommends 50 acres to be appropriated for filtration purposes; of this 50 he would only prepare 30 at present for filtration, and devote the remainder of the 100 for wide surface irrigation. The cost of works is estimated at £7,370; for preparation of land, including carriers and chamber, £10,400; making a total of £17,770—this is exclusive of purchase of land. For this outlay, the cleansing of the sewage may be effected with a return from the land of from £8 to £10 per acre, according to the manner in which the land is appropriated. If the Council determine to increase the area of the land to be utilised, by deciding that the sewage may be delivered at a high level, the increased cost of deflecting the conduit and the preparation of the land (100 acres) would increase the outlay by £55,000, exclusive of the cost of the land.

**COVENTRY.**—The Coventry City Council, on Tuesday, resolved to enforce the compulsory adoption of water-closets in place of the midden system throughout the city. A deputation of owners of property sought to influence the Council to adhere to the present system, on the ground that water-closets would prove more injurious to the public health.

**MANCHESTER.**—The annual meeting of the Manchester and Salford Ladies' Sanitary Association was held on Tuesday last. The Bishop of Manchester, who presided, said he rejoiced at the improvements carried on in Deansgate and elsewhere, because they destroyed a class of houses in which it was impossible for their inhabitants to lead healthy lives, and he urged a more complete co-organisation of our municipal executive in order that an official eye might be kept upon the houses springing up on every side of the city.

**PONTEFRAC.**—Two of the arches of the new covered reservoir at Pontefract recently fell in. It is now stated that this was owing to their having been built upon 20in. of puddled clay only. The Town Council are now endeavouring to ascertain who is to blame in the matter, but both Mr. Malcolm, the engineer, and Mr. Marsh, contractor, repudiate all liability, each declaring he had no faith in building on a puddled foundation. It has, therefore, been determined to consult some eminent engineer as to what is to be done.

**PURIFICATION OF THE THAMES.**—The Thames Conservators have obtained a report from Dr. Letheby as to the standard of purity which the districts abutting on the Thames below Teddington Lock should, in his opinion, be compelled to adopt with regard to their effluent sewage-water before allowing it to enter the

river. The following are the conditions recommended by Dr. Letheby, and which the Thames Conservators have determined to adopt:—"The effluent water shall be perfectly free from offensive smell and offensive taste, and it shall not contain anything which is poisonous or hurtful to fish or aquatic vegetation. 2. It shall not be more acid than one part of absolute muriatic acid in one thousand parts of water, nor more alkaline than one part of dry caustic soda in the like quantity of water. 3. It shall not contain per imperial gallon more than one grain of organic nitrogen, or more than five grains of suspended matter, or more than 100 grains of dissolved matter." Dr. Letheby adds that he considers this is a liberal standard, which can easily be realised in practice, and at the same time sufficiently stringent to protect the purity of the tidal water.

**THE BIRMINGHAM SANITARY CONFERENCE.**—The Conference on Sanitary Reform convened by the Mayor of Birmingham for the 14th of January is exciting interest throughout the country. A large number of ladies and gentlemen in Birmingham and from a distance, including the mayors of several boroughs, have expressed their intention of being present. Deputations from some of the most important Corporations and Local Boards of Health have been appointed.

**THE HALIFAX CORPORATION WATERWORKS.**—In the Year Book published by the Halifax Corporation for the years 1874-5 is given a description of the Halifax Corporation Waterworks, illustrated by a map showing the various reservoirs, with the gathering ground, and also the area supplied with water by the Halifax Corporation, prepared by Mr. J. Paskin, resident engineer of the works. From a table of particulars given, it seems that the drainage area in the Hebble Valley is 1,330 acres, the water being collected in the Ogdon and Mixenden Reservoirs, the former having a capacity of 221,806,000 gallons, and the latter 106,121,000. The estimated yield for town's supply is one and three-quarter million gallons per day, and the amount of compensation water to mill-owners on the stream is 990,000 gallons per day. In the Luddenden Valley there is a drainage area of 1,444 acres, the water being collected in the Warley Moor (or Fly) Reservoir, containing 193,250,000 gallons; the Castle Carr Reservoir, with a capacity of 59,142,000 gallons; and a second Castle Carr Reservoir, with a capacity of 63,011,000 gallons. The estimated yield for town's supply from this valley is two million gallons per day, and 1,440,000 gallons have daily to be sent down stream as compensation to mill-owners. The drainage area at Widdop and Greave Clough is 2,223 acres, from which the water will be collected in Widdop Reservoir, which is to have a capacity of 684,000,000 gallons, and will give the town a daily supply of two and a half million gallons, after providing 1,620,000 gallons of compensation water. In Walshaw Dean, where no works have yet been commenced, the Corporation has secured 2,325 acres of drainage ground, and the three reservoirs which are to be constructed there at some time will have a combined capacity of 626,000,000 gallons, furnishing the town with two and a half million gallons per day, besides giving as compensation water 1,674,000 gallons. It will thus be seen that when all these works are completed there will be a daily supply in ordinary seasons of 8,750,000 gallons per day for town use, besides furnishing to the streams 5,724,000 gallons per day. It may be many years before the Walshaw valley is utilised; but even without that, when the Widdop scheme is completed, Halifax will have one of the best water supplies in the kingdom.

**THE PURIFICATION OF THE LIFFEY.**—A deputation, headed by Sir Arthur Guinness and the Hon. David Plunket, waited on the Lord Lieutenant of Ireland on Monday, to request him to urge on the Government the necessity of taking measures for the purification of the Liffey. The deputation emanated from the recent citizens' meeting, and presented a memorial, which reviewed all the main drainage and other plans proposed during the last 20 years. The memorialists complained of the apathy of the corporation in not having taken effectual steps in a matter so important to the health of the city, and suggested that instead of the corporation main drainage committee an elective committee should be appointed. His Excellency assured the deputation that the Government were sensible of the importance of the matter, and that whenever the corporation or citizens should agree on a feasible plan they would advance the necessary funds on the security of the city rates.

**WARWICK.**—Mr. J. Thornhill Harrison, C.E., an inspector from the Office of the Local Government Board, has held an inquiry into the merits of the proposed supply of water by gravitation from Haseley. The inquiry was directed by the Local Government Board in consequence of an application by the Warwick Town Council, acting as the Warwick Urban Sanitary Authority, to borrow £17,500 from the Public Works Loan Commissioners, to carry out the scheme. Mr. Pritchard, C.E., the Borough Engineer, who has designed the works, gave evidence, and stated that the area of the watershed of the Haseley Brook proposed to be impounded was 1,500 acres. On either side of the roadway near Haseley Mill it was proposed to construct a reservoir, the one on the left hand side to be a settling reservoir, 10ft. deep, to contain 2,116,000 gallons; and that on the right a storage reservoir, of a depth of 16ft., of the capacity of 19,519,487 gallons. The site of the proposed works is 30ft. above the top of the water tower in Market-

street, and it is proposed to utilise this tower or not, as is found most desirable. Its capacity is 60,000 gallons. Whether the point of abstraction of the water at Haseley is above or below the mill, there will be a minimum daily supply of 150,000 gallons. Mr. Pritchard estimates the cost of the scheme at £17,500, made up as follows: Land and compensation, £2,500; legal and engineering expenses, £2,000; and cost of materials and labour in constructing the works, £13,000.

#### LAND AND BUILDING SOCIETIES.

**BUILDING SOCIETY LAW.**—A blunder accidentally crept into the Building Societies' Act of last session, whereby a measure intended to be permissive in its operation has been made compulsory on all societies. Representations on the subject have been made from Liverpool to the Home Office, and it is stated, on the part of the Home Secretary, that although the Government have no power to issue rules for the guidance of such societies except in accordance with the statute, they will lend their assistance in passing a bill for the correction of the mistake early in the ensuing session of Parliament.

**CONSERVATIVE LAND SOCIETY.**—On Tuesday, the twenty-second annual general meeting of the members of the above-named Society was held at the Society's offices, Norfolk-street, Strand, to receive the annual report of the executive committee. The report stated that the general total of receipts to Michaelmas, 1874, reached £2,011,320. 5s. 9d.; that the total withdrawals under the rules since the formation of the Society in 1852, to Michaelmas, 1874, were £599,389. 12s. 10d., and that the reserve or surplus fund to Michaelmas, 1874 (exclusive of office premises, &c.), amounted to £7,500. After having the reserve fund at that amount, the directors were enabled to produce this result—that every payment on the shares on the register of members at the annual meeting, not being in arrear, will realise 5 per cent. per annum for the year ending September 30, 1874.

**LEAMINGTON.**—The twenty-first annual meeting of the Leamington Permanent Benefit Building Society was held on Tuesday week. In their report the directors congratulated the members on the fact that in spite of the long-continued depression in trade, they were enabled to declare a bonus of 5s. per share, in addition to the 4 per cent. as per rule. 105 new shares have been entered during the year, 47 shares (£1,410) advanced on mortgage, and there was a cash balance of £820 in hand on the closing of the account.

**THE STAFFORDSHIRE POTTERIES ECONOMIC PERMANENT BENEFIT BUILDING SOCIETY.**—The twelfth annual meeting of this Society was held on Wednesday week, at the Town Hall, Hanley. The report showed that the past financial year had been the most prosperous the Society had ever experienced since its establishment. The Society still continues to pay the £5 bonus on all paid-up shares, in addition to the usual interest, making about 7½ per cent. compound interest.

#### LEGAL INTELLIGENCE.

**POWERS OF A LOCAL BOARD.**—CLEGG v. THE CASTLEFORD LOCAL BOARD OF HEALTH.—This was a suit, on Monday, in Vice-Chancellor Bacon's Court, Lincoln's Inn, to obtain a mandatory injunction compelling the Castleford Local Board to remove an obstruction to a sewer, and seeking damages. Messrs. Clegg, the plaintiffs, are maltsters and owners in fee of a piece of land near Castleford, on which they have built a dwelling-house, three malt-kilns, and some cottages, the drainage of which, until the obstruction complained of was made, passed into a sewer under the control of the Castleford Local Board of Health. In January, 1873, workmen in the employ of the Board closed the sewer by placing flag-stones across it, and thus stopped all drainage from the plaintiffs' premises, and the bill was immediately filed. The bill alleged that the stoppage was made out of spite, because the plaintiff had given evidence in a sewage case of "the Attorney-General v. the Castleford Board of Health." The defendants contended that they were acting within their statutory powers, and the plaintiffs having recently put up the third of their kilns, and thus increased the amount of sewage, that the Board, being under injunction in the information not to allow an increase in the flow of sewage matter into a certain water course, could not permit Messrs. Clegg to increase their discharge. The Vice-Chancellor said, though the Court would not interfere with a public body in the bona-fide exercise of Parliamentary powers, such a body would be restrained from the unlawful and improper use of those powers. In this case the Board had acquiesced for years in allowing the drainage of the plaintiffs' premises, and had taken sewage-rates from them, and if, which he did not admit, they had a right to prevent the drainage from the third, the newly-constructed, kiln from falling into the sewer, that did not give them a right to intercept the whole. He believed the fact was that the defendants, being irritated by the plaintiffs giving evidence against them, had acted in the wanton and outrageous manner they had. An injunction would be granted, with an inquiry as to the damage sustained by Messrs. Clegg.

**THE RATING OF THE CRYSTAL PALACE.**—During the whole of Friday Mr. Hardman was occupied at the Surrey Sessions hearing the appeal by the Crystal Palace Company against the assessment of their property in the hamlet of Penge, made by Messrs. Castle-



and Son, valuers, appointed by the assessment committee of the Croydon Union. The company had notice of the assessment on the 6th of September, 1873, and by the valuation the property of the company in the hamlet of Penge was assessed at £24,000, it having previously been assessed at £19,500. Mr. Meadows White, on behalf of the appellants, stated that the Crystal Palace Company were incorporated by Royal charter, granted on the 28th of January, 1863, and by such charter were authorised to purchase land in the parishes of Beckenham and Lewisham. The Crystal Palace buildings, and grounds adjoining, are situated partly in the parish of Penge and partly in Beckenham, and a very small portion indeed, but hardly worth mentioning, is in Camberwell. Of the ground 130 acres are in Penge, and 55 acres in Beckenham. The palace, he said, was not a very profitable undertaking. A fire at the palace burned down a portion of the buildings, which had never been rebuilt. This was a great loss. The company had since insured the whole of the Palace, which was an additional expense to them, and there was always something new to be done or something to be altered. The company had to get up entertainments, concerts, and great attractions for the people coming there. They had to spend their money, not knowing whether they would get it back again. In the year 1854 the assessment was at £15,000. Ten years afterwards it was increased to the amount of £19,500, and now it had been raised to £24,000. The Court ought not to assess it at such a sum, which would be a great hardship on the company. Several witnesses were then called, whose evidence went to show the value of the property in the palace and grounds, and likewise the expense of repairing the building and making alterations of various departments. The case was adjourned till Saturday for the respondents to go on with the case.—Mr. Clarke having then addressed the Court in favour of the assessment, and called witnesses, the Chairman assessed the value at £16,692, and granted costs against the respondents.

## CHIPS.

The Local Government Board has appointed Dr. Frankland to report on the water supplied by the Chelsea Company, with a view to remedy complaints.

Edward Fuelling, of 124, High-street, Nottingham, was summoned last week for refusing to comply with an order of the vestry to construct a drain into the sewer in front of his premises. Mr. Ingham fined the defendant £5, in addition to 40s. for one day's default, and 2s. costs.

Mr. O'Connor, plasterer, of Southport, has been doing certain proportions of his work in cement instead of flag and stone. The Operative Masons' Lodge have consequently informed him that he must let all his jobs in one contract, or members of the society will not do the rest of his stonework.

## Our Office Table.

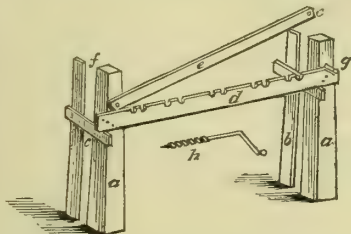
**TESTIMONIAL TO MR. E. W. PUGIN.**—Subscription lists have been started for the purpose of raising a fund to present a testimonial to Mr. E. W. Pugin. The heading of the subscription sheets is as follows—"At a meeting held at Ramsgate, on Wednesday, the 9th December, 1874, it was moved by Mr. Molloy, and seconded by Mr. Ball, that the persons assembled at that meeting constitute themselves a committee to collect and receive subscriptions from working men and others, of the parishes of Ramsgate and St. Lawrence, for the purpose of presenting a testimonial to E. W. Pugin, Esq., to evince their esteem and sympathy for him, and also their appreciation of the great benefits derived by them and the town of Ramsgate generally from the extensive works carried on by him in its vicinity."

**EXPIRATION OF A VERY OLD LEASE.**—A lease of 999 years is usually considered as good as freehold. Nevertheless it is not always so. An estate let on that term has just fallen in and reverted to the original holders, or rather their representatives. The land was situated at or near Woolwich, and was a thousand years ago Church property, but was leased to the Crown for military purposes, and was occupied by the War Office. Few incidents could speak more eloquently of the stability of English institutions, and the law-abiding nature of Englishmen and their respect for the rights of property, than that there should be an unbroken continuity of possession from the time of Alfred the Great to that of Queen Victoria.

**CIRCULAR SAW FOR CUTTING STONE.**—A circular saw for cutting stone has been invented in the United States. Small pieces of black diamond are set securely in pieces of steel or iron, which are then made fast by a rivet to the saw disc. One saw 5ft. in diameter has 30 dia-

mond teeth spaced at equal distances around the periphery, and is said to run well at 650 revolutions a minute. A stream of water is made to run over the blade when at work, which cools the saw and wets the stone.

**MORTISING POSTS.**—The following is a simple American contrivance, which will help greatly in making mortices:—*a a* are uprights, set firmly in the ground, 5ft. apart; *b c*, smaller uprights, set back of main ones at sufficient distance to admit the post which it is desired to mortise, and which rests on the cross-piece connecting larger and smaller uprights; *d* is a board nailed on to the front of the larger posts, with slots sawed down in it to admit the shaft of the auger; and *e*, a



movable board, which moves around a pin. When boring a hole, this board is fastened down with a peg at *g*, which holds the shaft of the auger. Take the handle of your auger, and fasten on a crank firmly, with sweep according to size of auger and strength of arm, 15in. being about the proper length for 2in. auger (see *h*). Lay your post on cross-pieces, and fasten with a wedge, and you can turn out a good many auger holes in a short time with much more ease than with the common handle. The main posts, *a a*, should be as thick as the pod of your auger is long. The slots in front board should correspond with the post as to length of mortices and distance apart. The remaining work on mortices after boring can be done with an axe or chisel.

**ANOTHER OPEN SPACE LOST TO LONDON.**—At the meeting of the Metropolitan Board of Works, on Friday last, the Works and General Purposes Committee reported on the letters received from the Vestry of Lambeth, and on the memorial of the inhabitants of Stockwell and the neighbourhood, relative to the preservation of Stockwell-green as an open space, stating the present position of the question, and recommending that the Vestry and memorialists be informed that unless building operations upon the property are stayed, the Board will be compelled to decline to proceed with the Bill for the preservation of the Green, and which they have given notice to introduce into Parliament."

**COMMUNICATION BETWEEN HOLBORN AND THE STRAND VIA LINCOLN'S INN FIELDS.**—At the Metropolitan Board of Works, on Friday last, the question of providing improved access from Holborn to Lincoln's Inn Fields and the New Law Courts arose, on a recommendation of the Works and General Purposes Committee "That Messrs. Rivington and Sons be informed, in reply to their letter inquiring whether the Board contemplate purchasing certain premises in Great Turnstile and Whetstone Park, for the purpose of making a new street from Holborn to Lincoln's Inn Fields, that the Board are not at present prepared to deal with the question." The motion was carried, although several members strongly advised the Board to take advantage of the opportunity at present afforded them, owing to the destruction by fire of Messrs. Rivington's premises, which occupied a third of the ground necessary to make the proposed new street. On the other hand, the Board was advised not to move in the matter, as the Government would be sure to do something to provide better access to the New Law Courts from the north. The consequence will be that when the improvement is carried out, as it must inevitably be, the cost will be greatly enhanced. Yet the Board professes to act in the interests of economy!

**THE INDESTRUCTIBLE SCHOOL-DESK.**—Mr. Thomas Laurie has just introduced a new desk, which he calls the "Indestructible," in which several good points are combined. It economises space, is easily converted into a writing-desk or table, need not be screwed to the floor, and is very cheap. It is simply made, and the working parts are all of wrought iron, and so confident is the manufacturer of the capability of the desk to resist hard wear, that he guarantees each one supplied for three years.

**FOREMEN BUILDERS' AND CLERKS OF WORKS' INSTITUTION.**—The Lecture Session for 1875 will be opened at the Institution, 9, Conduit-street, W., on January 13th, with a lecture by Fredk. J. Furnivall, Esq., M.A., on "Geoffrey Chaucer, Poet; Clerk of Works to King Richard II." The second lecture will be by Henry B. Wheatley, Esq., on "Old London Buildings." February 10th.

**PROPOSED SHIP CANAL FROM HULL TO LIVERPOOL, VIA SHEFFIELD, &c.**—At the latest meeting of the Hull Chamber of Commerce, a letter was read from Mr. Austin, C.E., stating his proposal, "after long study and careful consideration," for a tidal ship canal connecting the two tidal rivers of the Humber and Mersey with the Don. He proposed to unite these rivers by means of a junction canal, meeting at or near to Sheffield, so as to form one continuous line of traffic (by ships and vessels) between Hull and Liverpool through Rotherham, Doncaster, Sheffield, Stockport, and Warrington, to Liverpool and Birkenhead; from thence across the Irish Channel and onward by another ship canal to Donegal Bay and the Atlantic Ocean track to America.

**A NAUTICAL DECALOGUE.**—The old parish church of Conway is in course of restoration, and a few weeks ago the internal fittings were disposed of by auction. Amongst other relics of the ancient structure, the Conway Corporation, for the sum of half-a-sovereign, became possessed of a large tablet bearing the Ten Commandments, which had for many years occupied a prominent position in the chancel. What they wanted a copy of the Decalogue for naturally provoked much local gossip. However, a few days ago the tablet reappeared on the sea-side of the lower gate of Conway Castle with the Ten Commandments brushed away, and replaced by a set of nautical commandments relative to the amounts payable as harbour dues and penalties for depositing rubbish in the river.

**FOUL GAS IN SEWERS.**—No small consternation was recently created by an explosion of foul gas in one of the sewers at Greenwich. The alarm was due to the report that the explosive compound was neither more nor less than sewer gas: but it was soon apparent that some kind of inflammable gas had got mixed with the sewer gas, which latter by itself is not explosive. The Metropolitan Board have instituted a searching inquiry, and their consulting chemist reports that the sewer gas which exploded had previously become mixed with a "combustible vapour arising from some material of the character of the more volatile kinds of petroleum." The source of the petroleum in the Greenwich sewer is traced to a manufactory where materials are prepared for making a new kind of gas.

## CHUBB'S IRON DOORS

AND SAFES,

Fire and Thief-Resisting.

CHUBB AND SON,

57, S. Paul's Church-yard, E.C.  
And 68, S. James's-street, S.W.—[ADVT.] } London.

## Trade News.

## WAGES MOVEMENT.

**BIRKENHEAD.**—A dispute has arisen between the riveters, platers, and other men engaged in the reconstruction of the Liverpool Landing-stage and their employers, Messrs. Brassey and Co., which is likely to delay the completion of this important undertaking. The cause of the dispute is the amount of work which should be executed by the men. It is asserted that the employers insist upon as much work being completed in the short days of winter as the men performed in the long days of summer. In the summer a working week is equivalent to 54 hours, but in the winter the labour extends over only 42½ hours. The men, it is alleged, require that the amount of work should be reduced in proportion to the diminished time; and the masters refusing to comply with the request, some of the men left their work on the 30th ultimo, and a few days since those engaged on the portion of the stage lying in the Great Float, Birkenhead, and those employed in the shop, struck.

**GLASGOW.**—A meeting of joiners on strike was held in the Hyde-park-street Hall, Glasgow, on Tuesday. After much discussion it was moved that work be resumed on the following day at the reduced rate. An amendment in favour of resisting any reduction was subsequently put. There were only nine votes for the former, while upwards of 200 supported the latter. A meeting of Glasgow



joiners, at which Mr. Macfarlane presided, was held in the hall of the trade, Alston-street, the same night. There was but a meagre attendance. It was explained by the Chairman that the meeting had been called to consider the claims of their brethren on strike. It was intimated that the number on strike would be greatly augmented on Friday, when it was understood Thomson's employes would come out. The following motion was then carried unanimously—"That this meeting is of opinion that the proposed reduction in the shipbuilding trade is unwarranted, and that it pledge itself to support the joiners of the Clyde district to the best of its ability by raising subscriptions for their support amongst the building trade in the city." Before the meeting broke up a large number of subscription-sheets were issued in name of the Strike Committee, urging the present necessity of assisting the strike men. The time in Messrs. Thomson's work expires on Friday (to-day) when it is expected the whole yard will cease work.

**SHEFFIELD.**—Owing to the great falling off, there has been in the orders for files from the United States, a large number of men have either been discharged or are now under notice. One leading house that a few months ago had eighty hearths going—each giving work to five or six men—will on Saturday have only fifteen hearths at work. Other houses are also stinting production.

**THE PENRHYN QUARRIES.**—Saturday was the first monthly settling day since the resumption of work at Lord Penrhyn's quarries. The production of slates during the month has been far in excess of any previous monthly output at these quarries; and the bargains having, under Lord Penrhyn's instructions, been let to the men on most liberal terms, the wages all round averaged on Saturday an increase of fully 30 per cent. as compared with the settlements prior to the strike. From a balance-sheet which has been prepared, showing the receipts and expenditure of subscriptions received towards the support of the men during the strike, it appears that the total receipts amounted to £3,500, £1,100 of which was contributed by the Llanberis quarrymen. After satisfying all claims, there remains a balance of nearly £400, and this is to be deposited in the bank in the name of six trustees, to meet future exigencies.

## The Timber Trade.

THE wholesale prices of timber, deals, &c., are as follows. There is not much business doing, but the time of year is in a great measure the explanation. Prices are expected to show a further decline next spring.

Per 120, 12ft. 1½ by 11.				
		£ s.	£ s.	
Geffe 1 & 2 yellow	3 by 11	14 0		
" 3rd "	2 by 9	13 0		
" 4th "	3 by 8	13 0	13 5	
" 1 & 2 white	2 by 7	12 10		
" 4th "	3 by 11	11 10		
Soderham, 1 & 2 yellow	4 by 11	10 10		
" 3rd "	2 by 9	8 10		
" 4th "	2 by 8	18 5	13 10	
" 3rd "	2 by 8	12 10		
" 4th "	3 by 7	12 10		
Ulaborg, 1st "	4 by 9	11 10		
" 2nd "	4 by 8	11 5		
Petersburg 1st yellow	3 by 9	12 10		
" 2nd "	3 by 9	14 10		
" 3rd "	3 by 7	14 0		
" 4th "	3 by 9	12 0		
" 1st white	3 by 11	11 10		
Archangel, 1st yellow	3 by 7	9 10		
" 3rd "	3 by 9	16 10		
Holmsund 1 & 2 yel.	3 by 11	16 0		
" 3rd "	4 by 9	13 10		
Strommas, 1 & 2 "	4 by 9	12 10	12 10	
" 3rd "	3 by 9	12 5		
Sandarne, 3rd "	4 by 9	12 10		
Husum, 1 & 2 "	4 by 9	12 10		
Bjorneberg, 1st "	3 by 9	11 10		
" 3rd "	3 by 8	10 0		
Narva, 2nd white	3 by 9	9 10		
" 3rd "	3 by 11	8 10		
Gamla Carleby, 1 & 2 yel.	2½ by 7	9 10		
" 1 & 2 wh.	3 by 9	8 10		
" 2nd "	2½ by 7	8 10		
Nordmaling, 1 & 2 yel.	3 by 9	13 10		
" 3rd "	2½ by 7	12 10		
" 4th "	2½ by 7	12 5		
" 5th "	2½ by 7	10 10		
Gothenburg, 1 & 2 "	3 by 9	13 10		
" 3rd "	3 by 9	12 10		
Jacobsstadt, white	3 by 9	8 5	8 10	
" 3rd "	3 by 8	7 0		
Quebec, 1st bright pine		21 0	24 0	
" 2nd "		13 0	14 0	
" 3rd "		10 0	11 0	
" 1st floated pine		20 0	21 0	
" 2nd "		13 0	14 0	
" 3rd "		9 0	10 0	
United States pitch pine		12 10	15 0	
Per 120, 12ft. 2½ by 6½.				
Dram, 2nd yellow	2½ by 6½	8 0	9 0	
" 3rd "		8 0		

Per 120, 12ft. 3 by 9.

	£ s.	c s.
Miramichi, unsorted spruce	12 0	14 10
Quebec, 1st spruce	18 0	
" 2nd "	13 10	14 0
St. John's, unsorted spruce	14 0	15 0

Per 40ft. 3in.

Dantzic crown deck deals	1 5	1 12
" brack	0 17	1 2

Prepared flooring, at per square.

Gothenburg, 1st yel.	1½ by 7	17 6	
" 2nd "	1½ by 6	13 9	
Fredrickstadt, 2nd yel.	1½ by 6½	16 3	16 6
" 3rd "	1 by 6	12 3	
Dram, 2nd white	1 by 5	9 3	
Fredrickstadt, 3rd wh.	¾ by 6½	9 9	10 0

Per cubic fathom.

Petersburg lathwood	8 0	9 10
Riga, &c.	6 0	7 0

Per mille of pipe:

	£ s.	c s.
Crown Memel pipe staves.	255 0	255 0
Brack	180 0	195 0
Canadian "standard" pipe.	65 0	70 0
" puncheon, per 1,200 pieces	31 0	32 0
United States pipe	35 0	67 10
" Hind. heavy and extra	30 0	45 0
" slight	17 0	21 0

Per 18ft. cube.

Riga crown wainscot logs	5 10	6 0
" brack	4 15	5 0
Memel crown	4 15	5 10
" brack	3 15	4 5

Firewood, per cubic fathom.

Swedish deal ends	4 10	5 0
Norway red and white boards	4 0	4 10
" round and slabs	2 15	3 5

Per foot run.

	s. d.	s. d.
Norway poles	0 1½	0 2

Per load of 50 cubic feet:

	£ s.	c s.
Stettin fir	3 0	3 10
Swedish	2 10	2 15
" small	2 5	2 15
Riga	3 10	4 5
Baltic crown	4 0	5 10
" best middling	3 10	4 10
" good ditto and 2nd	3 0	4 0
" common middling	2 15	3 0
" undersized	2 12	2 15
Memel crown oak	5 10	6 0
" Brack	5 5	
Large yellow pine	5 10	6 10
Waney board	5 10	6 10
Small	4 0	4 10
Pitch pine	3 15	4 5
Quebec oak	7 0	8 0
Rock elm	5 10	6 0
Ash	5 10	6 5
Quebec large birch	5 10	6 0
Indian teak	11 0	14 0
British Guiana greenheart	12 10	13 10
Australian ironbark	8 10	11 0

Per superficial foot.

	s. d.	s. d.
Cuba cedar	0 4½	0 5
Honduras	0 3½	0 4½
Australian	0 3½	0 4½
Pencil	0 2	0 3
Honduras mahogany, cargo avge.	0 4½	0 6
Mexican	0 4½	0 5
Tabasco	5 0	6 5
Cuba	0 5½	0 10
St. Domingo	0 7	0 10
" curis	1 0	2 0

## WHITLAND ABBEY GREEN SLATES.

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## TENDERS.

**HARTLEPOOL.**—For alterations and additions to the Minerva Brewery, Hartlepool, for Mr. John Harker. Mr. Wm. W. Collie, architect, Sunderland. Accepted tenders

	£	s.	d.
Bricklayer and Slater's work.			
Curry	671	14	0
Carpenter and Joiner's work.			
Forster	304	0	0
Plant and Engineer's work.			
Morton	1,048	7	6

**LONDON.**—For the erection of premises Nos. 115 and 117, Cannon-street, City, for Sir J. G. Tollemache Sinclair, Bart., M.P. Mr. J. Lewis Holmes, architect. Quantities estimated by Mr. Waghorn.

	£	s.	d.
Holland and Hannen	27,240	0	0
Brass	6,797	0	0
Chappell	6,620	0	0
Kilby	6,572	0	0
Sommerville & Smith	6,351	0	0
Kirk and Co.	6,465	0	0
Dove Bros.	6,435	0	0
Meritt and Ashby	6,202	0	0
Scrivener and White	6,103	0	0

**LONDON.**—For general repairs and painting, 35, Finsbury-square, for the City of London Truss Society. Mr. Chas. Field Clarke, architect.

Thoen	£190	0	0
Heaps	167	10	0
Greenwood and Son (accepted)	165	10	0

**LONDON.**—For the extension of Little Chelsea workhouse, for the Guardians of the Poor of St. George's, Hanover-square, consisting of an infirmary for 850 patients, able-bodied workhouse for 400 inmates, and for enlarging the infirm wards to accommodate 785, being in all for 2,035 inmates, including also a chapel for 600, and new fences and roads, engineering works, gas-fittings, and fittings and fixtures of every description. Mr. H. Saxon Snell, architect. Quantities by Messrs. Lansdown and Pollard, and the architect.

Nightingale	£108,440	0	0
Shimpon and Baker	106,000	0	0
Gannon and Sons	104,900	0	0
Hill, Higgs, and Co.	104,543	0	0
Chapell	103,712	0	0
Kirk and Co.	101,981	0	0
Perry and Co.	100,817	0	0
Crockett	99,973	0	0
Wall Bros.	99,337	0	0
Thorn and Co.	99,045	0	0
Elkington	95,500	0	0
Howard (accepted conditionally)	95,400	0	0

The architect's estimate was £100,000.

**MANOR PARK CEMETERY.**—For fencing in portion of the cemetery.

	Fencing 5ft. 6in. high at per rod.	Fencing 4ft. high at per rod.
Rivett	£2 12 6	£1 19 6
France	2 9 0	2 2 6
Astell and Sons	1 18 6	1 9 6
Headie Bros.	1 17 6	1 10 0
Turner and Son	1 17 0	1 5 0
Hayward	1 15 0	1 7 6
May & Son (too late)	1 15 0	1 6 6
Stenning and Son	1 14 6	1 6 6
Wainwright and Co.	1 13 0	1 8 0
Stone (accepted)	1 6 11	1 0 10

**POULTRY.**—For further foundations and basement of the Gresham Life Assurance Society's Offices, Mr. J. J. Cole, architect. Quantities by Mr. James Barnett.

Lander	£12,680	0	0
Ashby and Sons	12,138	0	0
Colls and Sons	11,111	0	0

**SYDENHAM.**—For new wing to villa. Mr. W. H. Thomas, architect.

Ryder and Son	£1,578	0	0
Crabb (accepted)	1,412	0	0
Gates	1,393	0	0

**WORCESTER.**—For branch bank for the Stourbridge and Kidderminster Banking Co. Mr. H. L. Florence, architect. Quantities by Mr. L. C. Riddett.

Jones and Allen	£7,500	0	0
Dixon	7,390	0	0
Wells and Drew	7,334	0	0
Binnian and Son	6,850	0	0
Walford	6,625	0	0
Everal	6,499	0	0
Collins and Cullis	6,450	0	0
Wood and Sons	6,313	0	0

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**BATH STONE OFFICE:** (ADVT.) **CORSHAM, WILTS.**

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## BANKRUPTS.

(To Surrender in the Country.)

Richard Livett, Balham-hill, builder, Jan. 8, at Wandsworth.—William Nichols, Burton-on-Trent, plumber, copper-smith, and engineer, Dec. 30, at Burton-on-Trent.

## DECLARATIONS OF DIVIDENDS.

T. Atkinson, Bradford, builder, div. 7s. — R. Carlisle Preston, builder, div. 8d.

## PARTNERSHIPS DISSOLVED.

Bickersteth and Co., Leigh, near Manchester, oil and lead merchants. — Maycock and Bell, Manchester and Sowerby Bridge, architects. — Flckton and Abbott, Sheffield, architects. — Edgar Dawes and Co., Eastbourne, lime merchants.

## COMPETITIONS OPEN.

**PAISLEY, Feb. 1.**—For designs with specifications and estimates for the erection of a Town Hall. Premiums of £100 for the 1st, £50 for the 2nd, and £25 for the 3rd best design. Town Clerk, Council Chambers, Paisley.

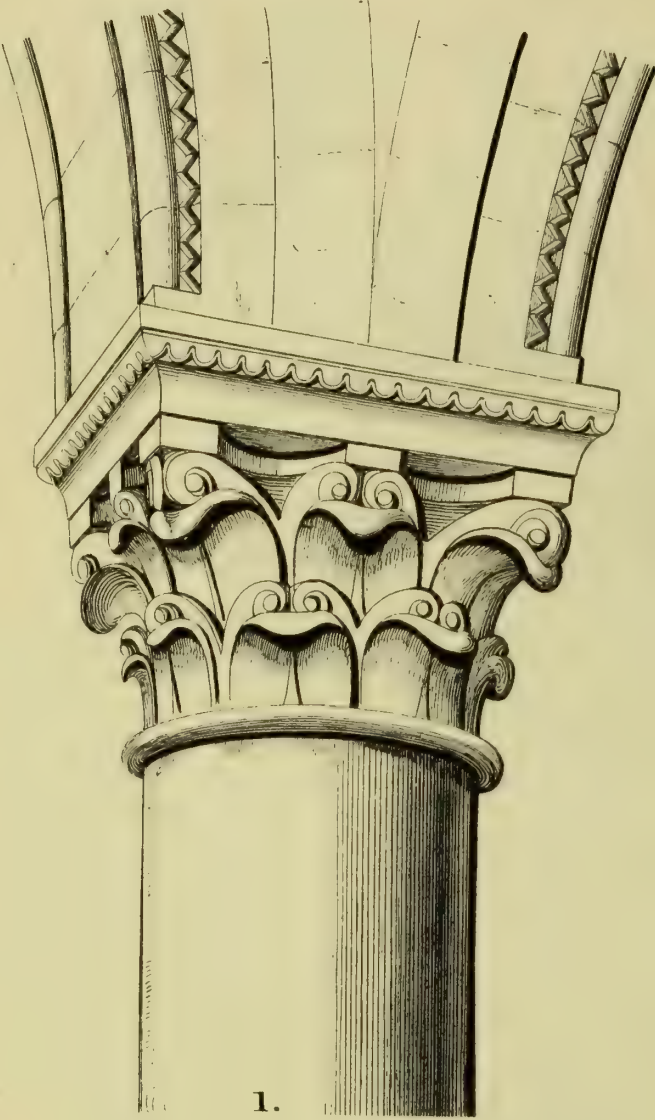
**SECKFORD CHARITY, Dec. 24.**—For drawings for a public pump, with drinking trough for dogs, horses, and cattle. A premium of £5. 5s. will be given for the best design. Mr. J. R. Wood, Clerk to the Trustees, Seckford Office, Woodbridge.

**WIGAN.**—For designs for a new market house. Premiums of £50 for the best, and £25 for the second best designs. Mr. W. Peace, Town Clerk, Wigan.

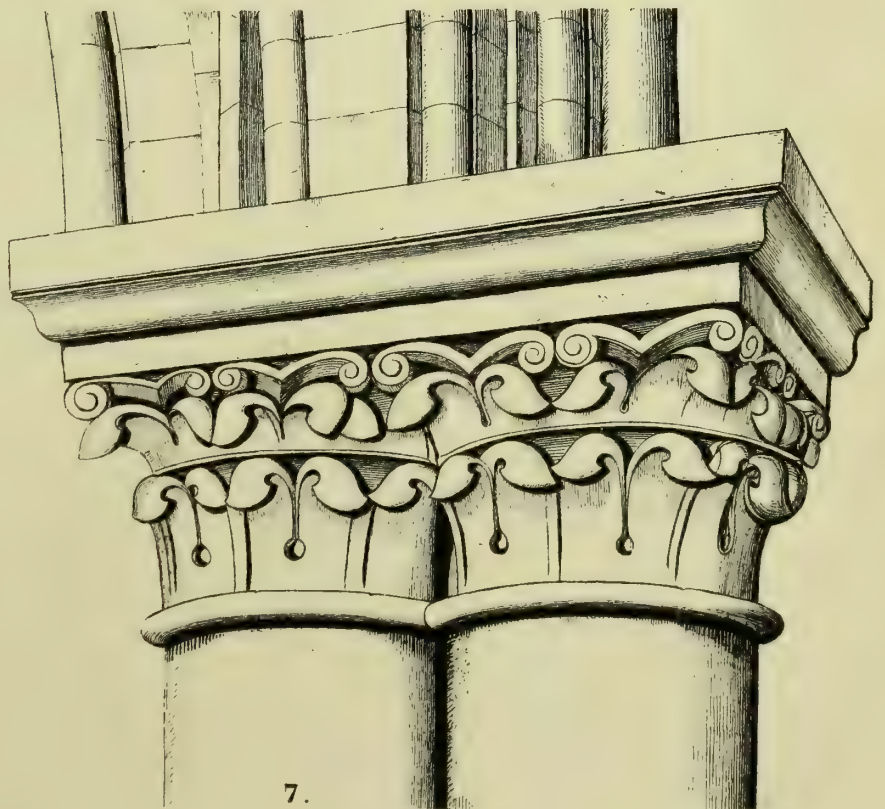
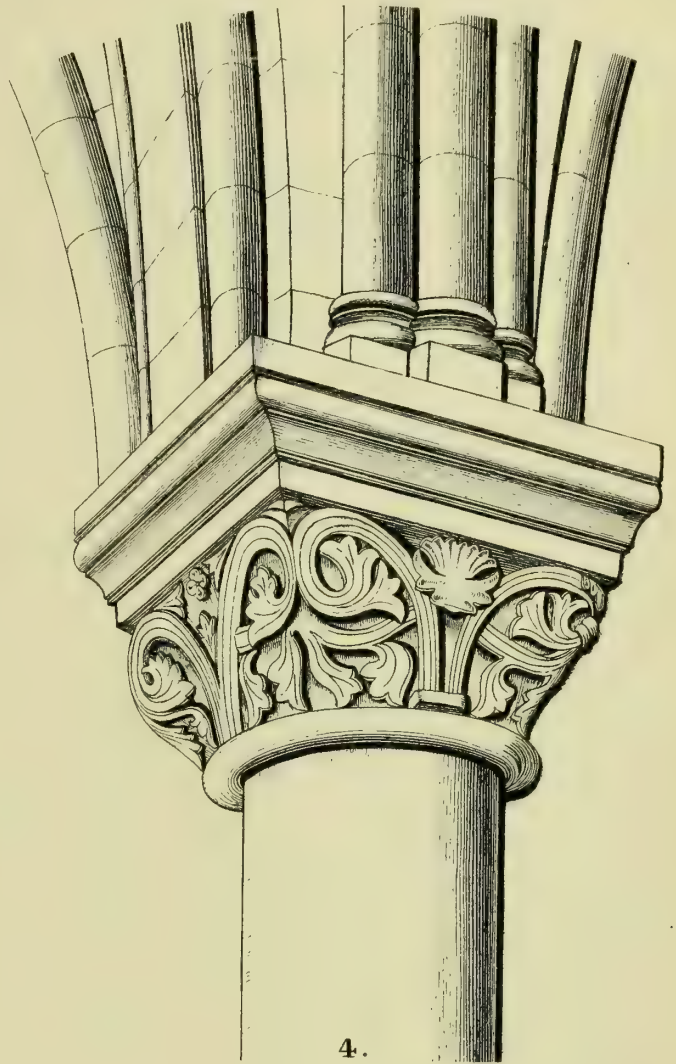
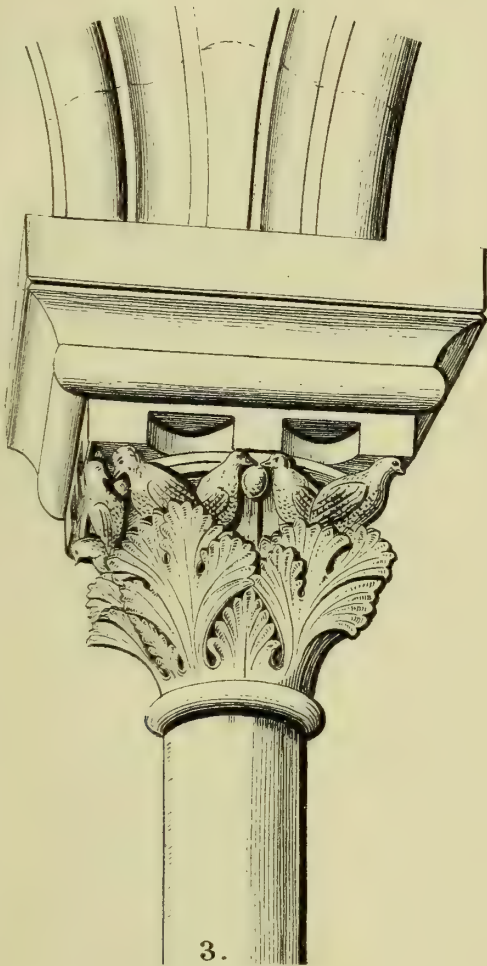
















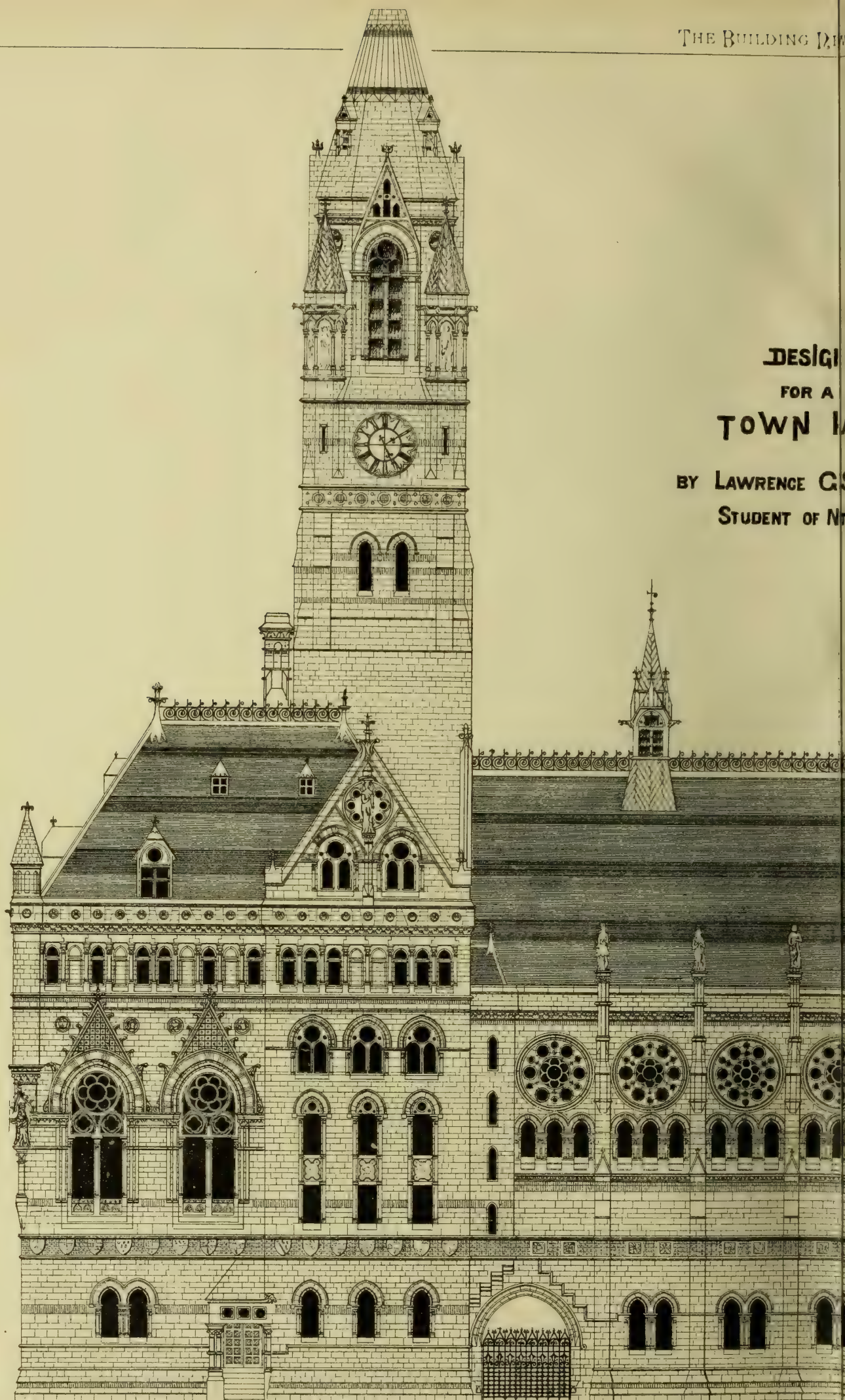






DESIGN  
FOR A  
TOWN HALL

BY LAWRENCE G. ...  
STUDENT OF N...



0 5 10 20 30 40 FEET.

ELEVATION TOWARD

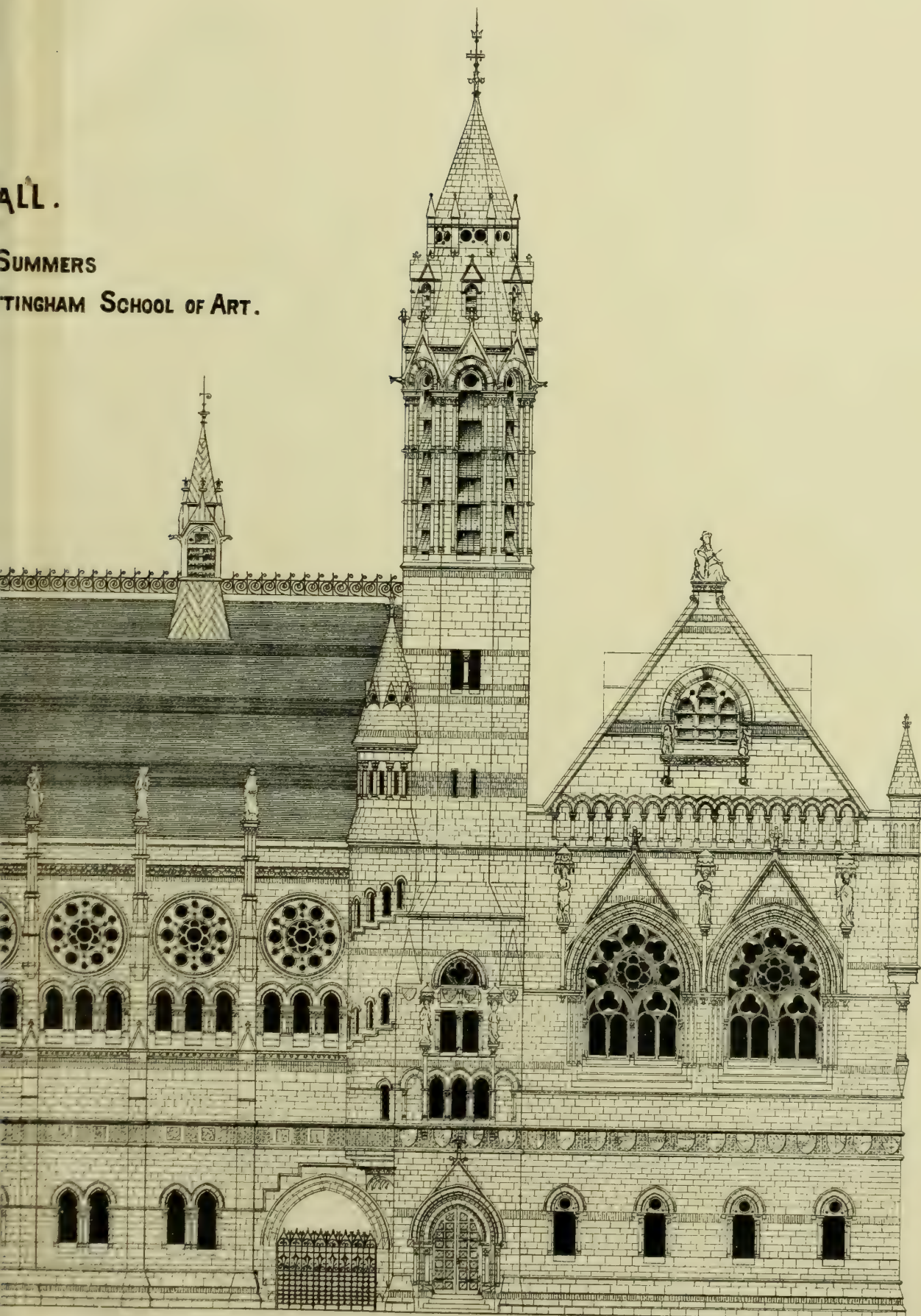


S. DEC 25. 1874.

ALL.

SUMMERS

TINGHAM SCHOOL OF ART.

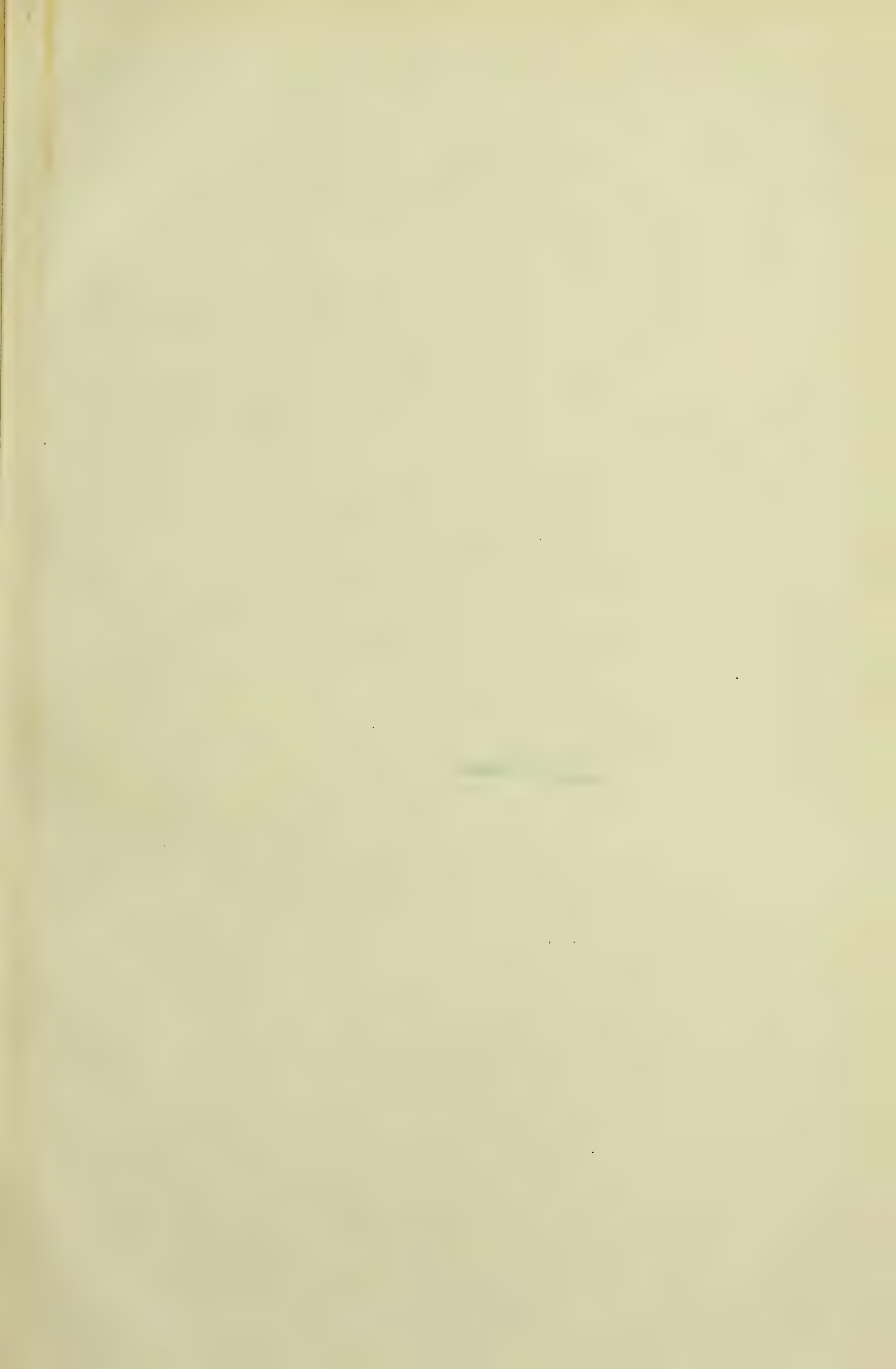


POVLTRY.



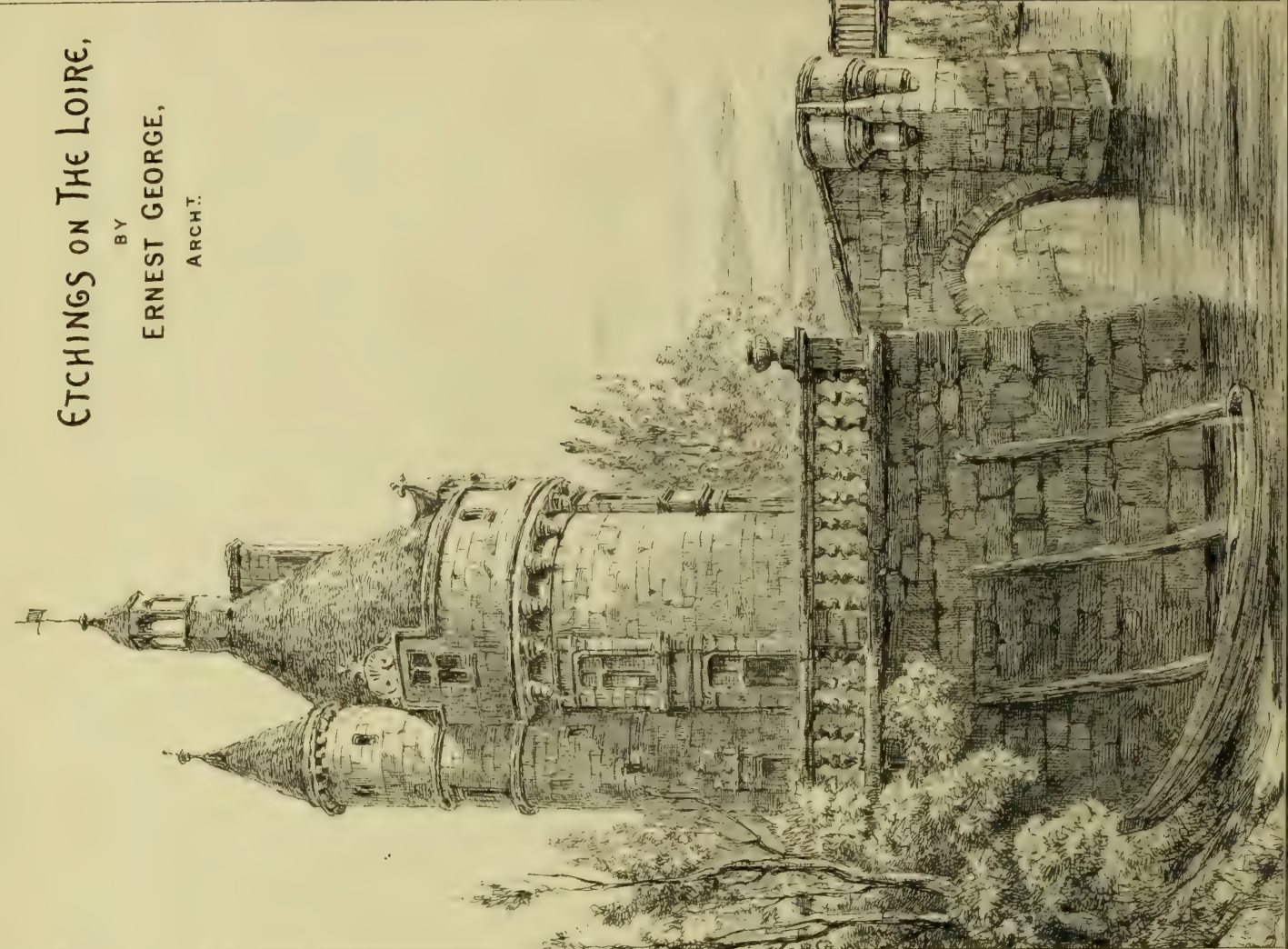
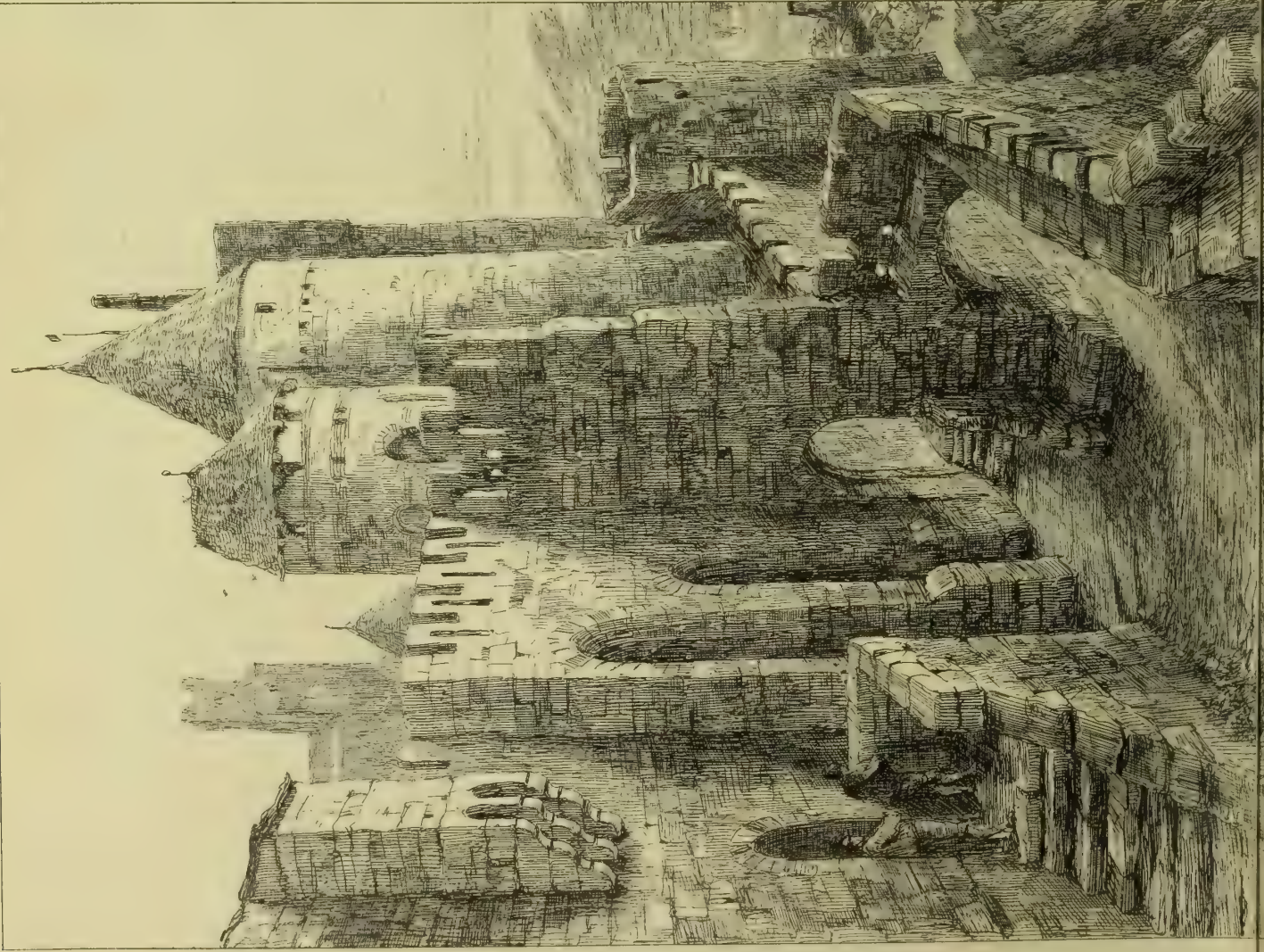




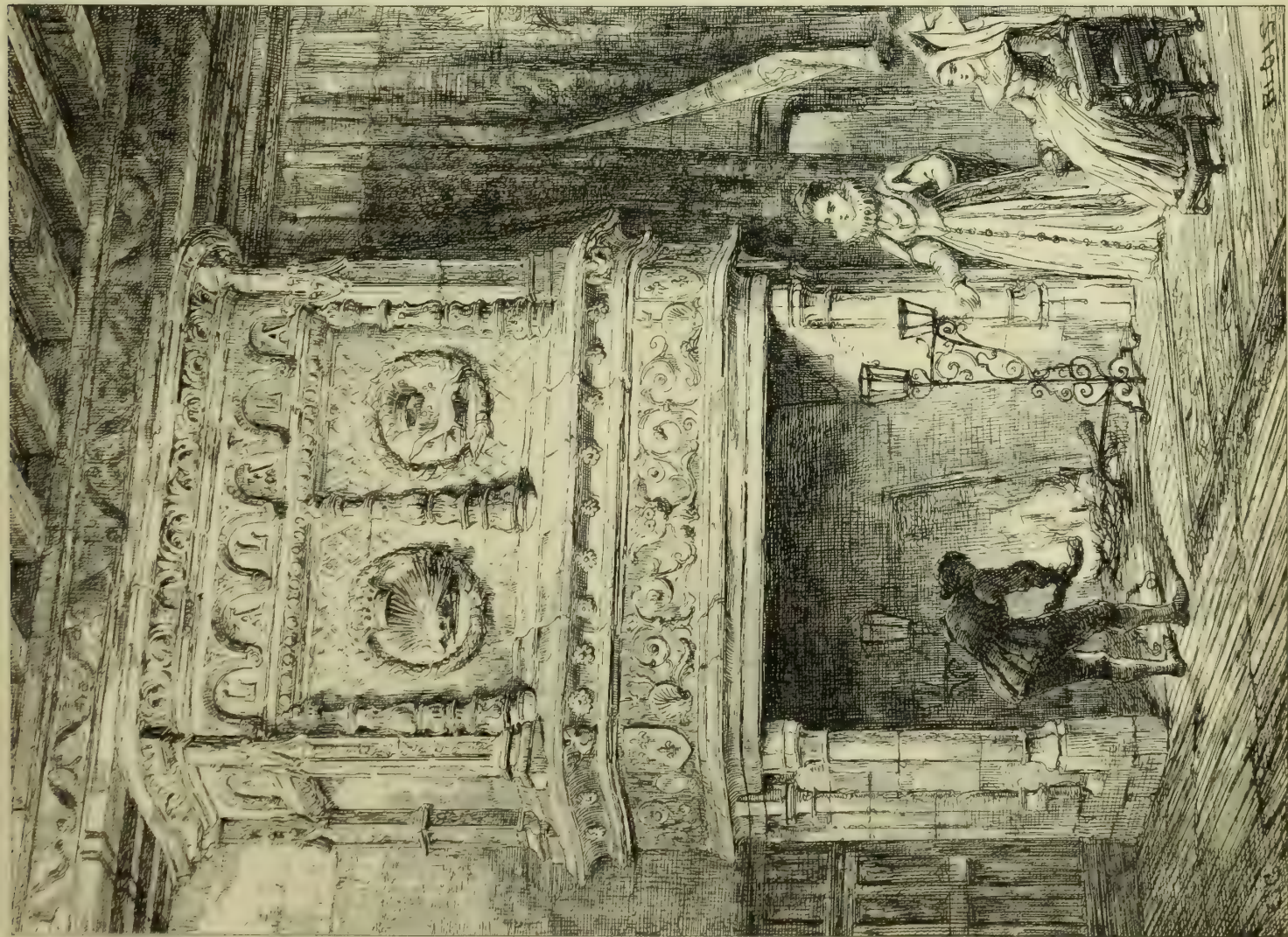




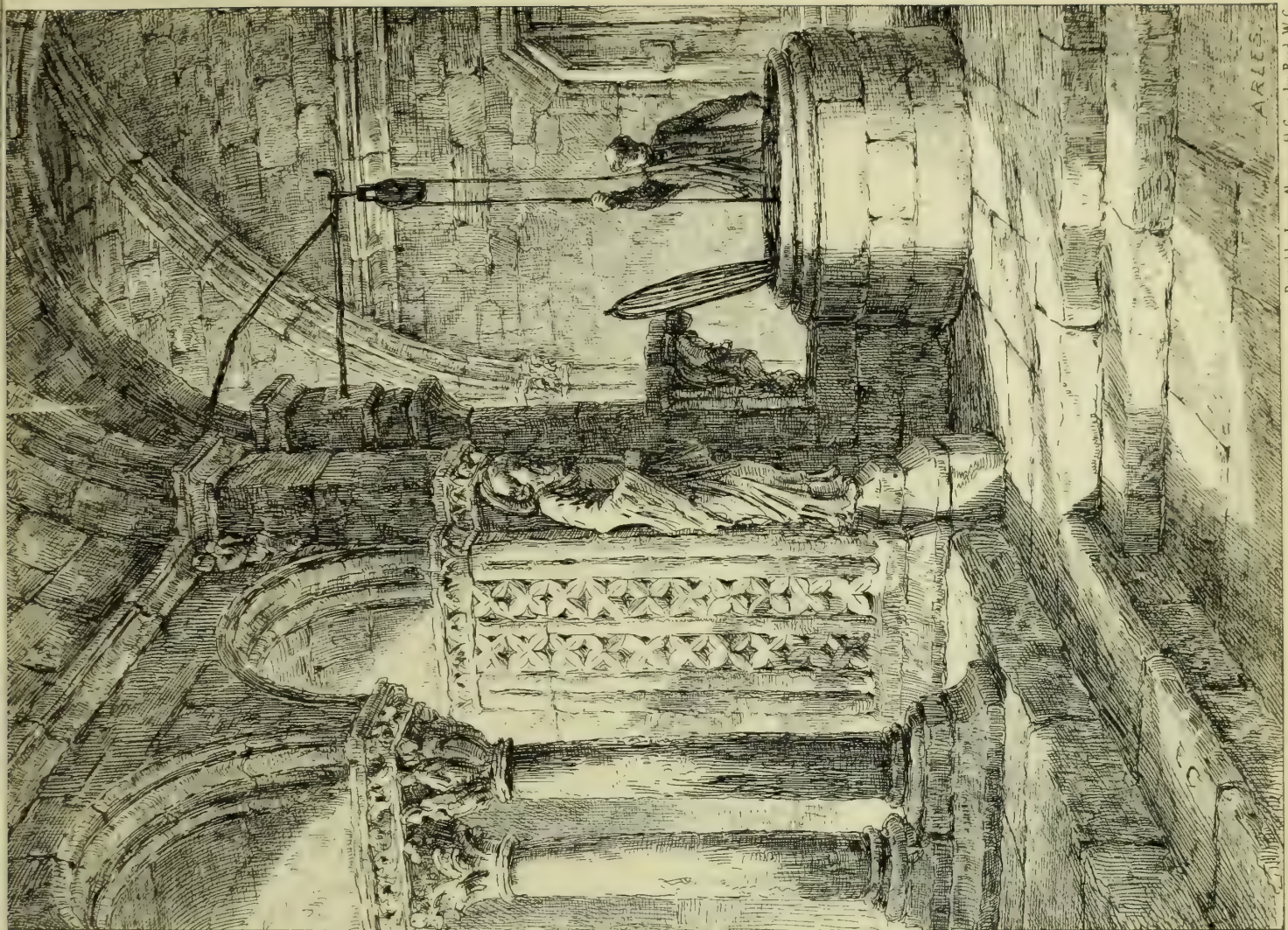
ETCHINGS ON THE LOIRE,  
BY  
ERNEST GEORGE,  
ARCHT.







ARLES



ARLES

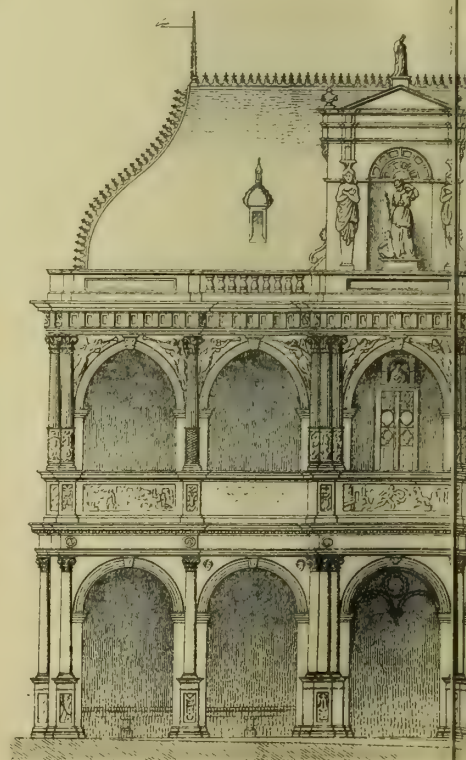
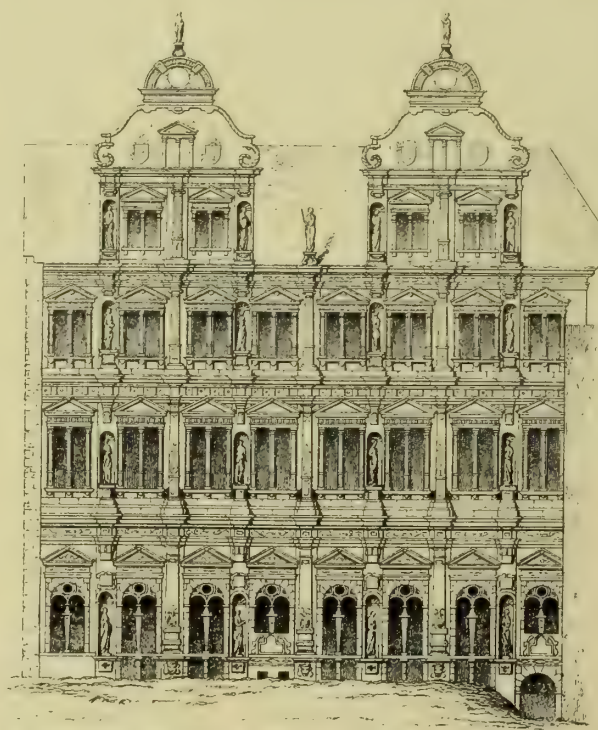
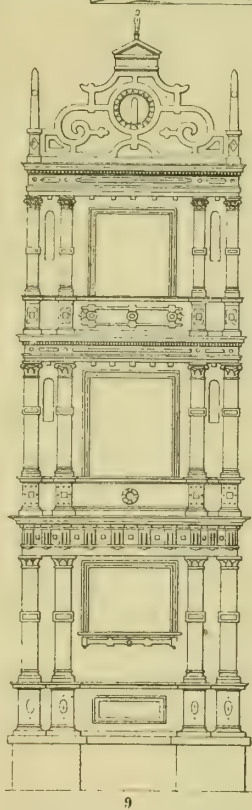
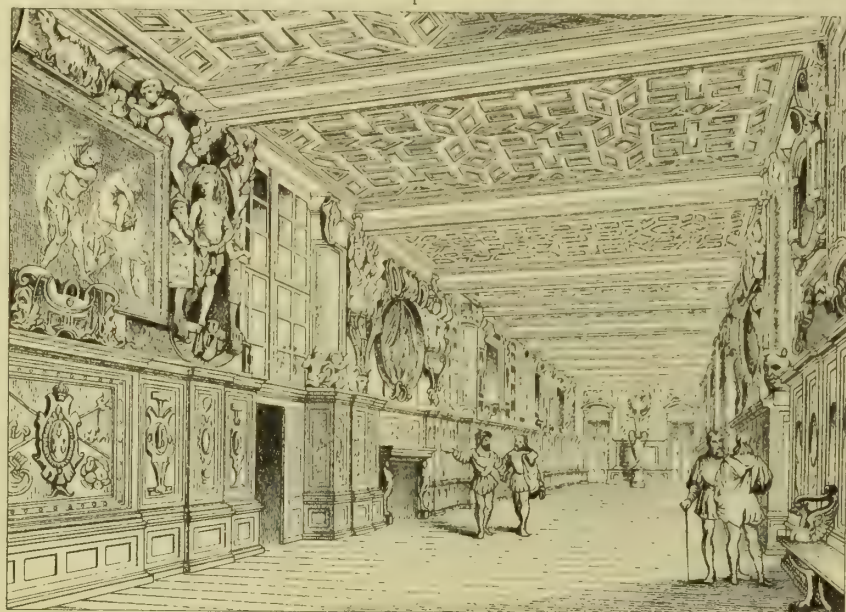
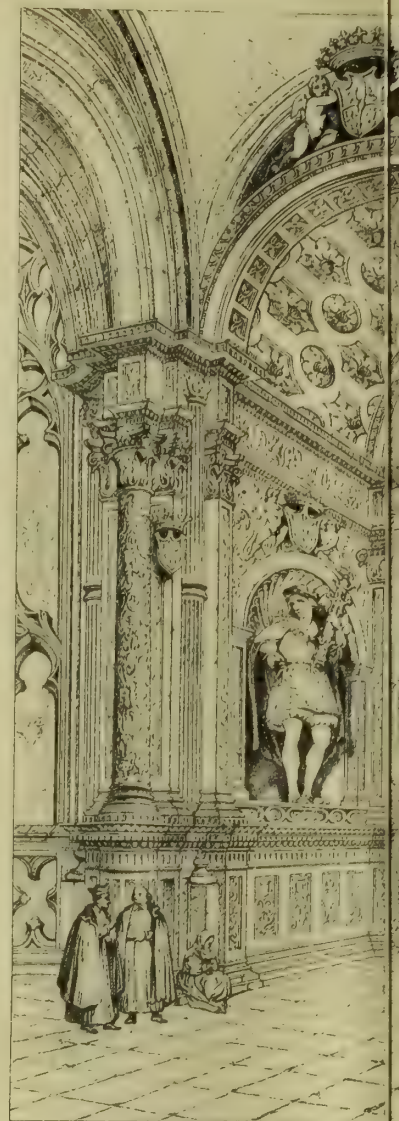
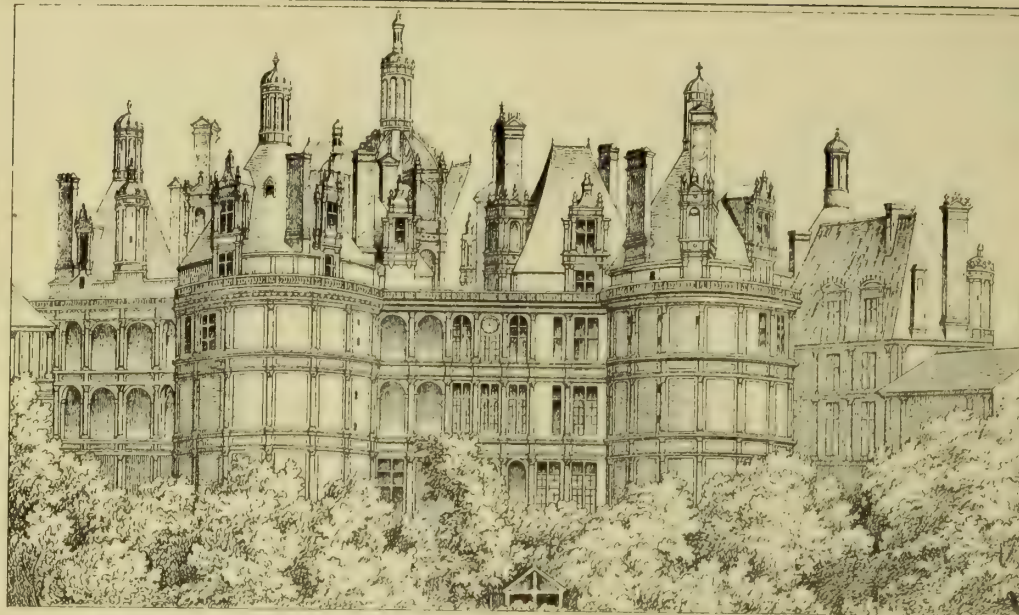










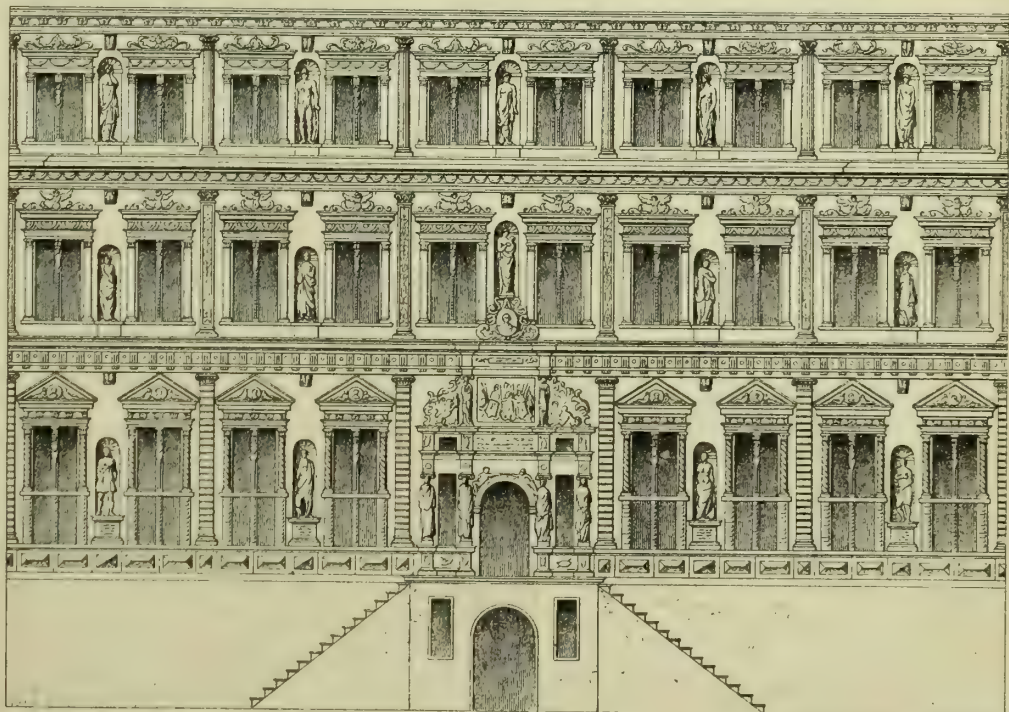
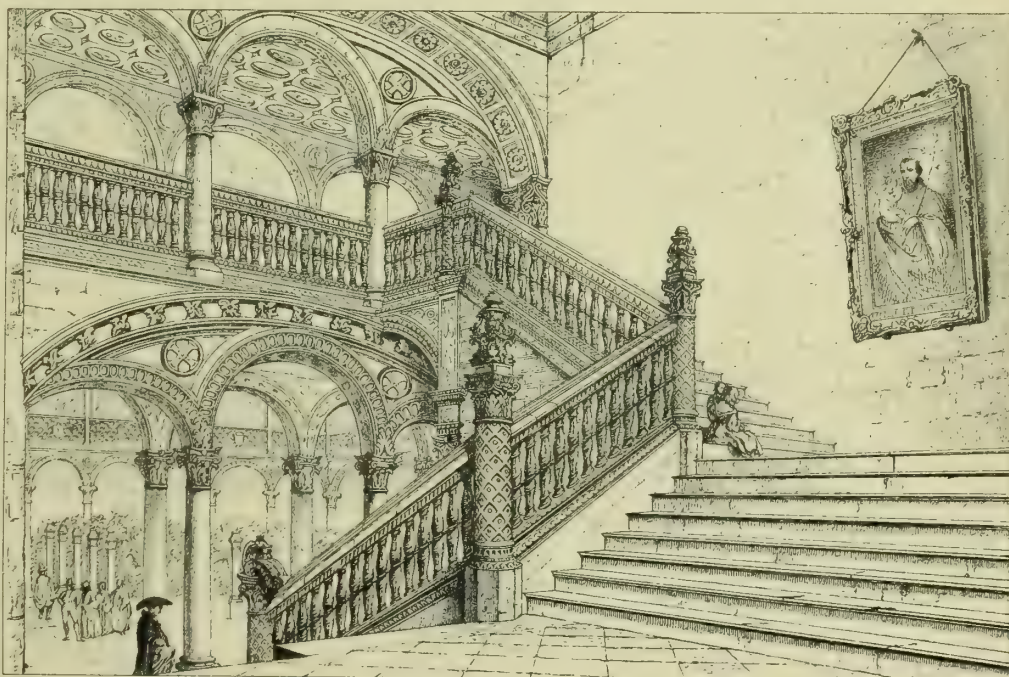
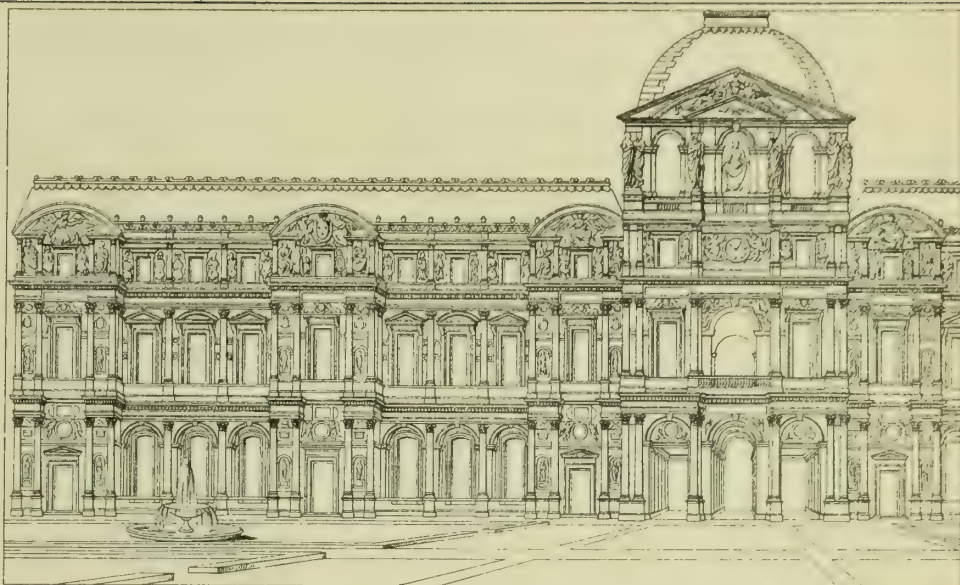


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## THE BUILDING NEWS.

LONDON, FRIDAY, DECEMBER 25, 1874.

## EARLY FRENCH GOTHIC.

MR. SHARPE'S zeal and indefatigable efforts to promote the advancement of the profession in general, and of its younger members in particular, deserve to be remembered with a lasting sense of gratitude. Few men have won so high an esteem from the architectural profession as Mr. Sharpe. The conduct of a large number of the members of the Association over a foreign territory last autumn required an amount of tact, energy, and purpose, which Mr. Sharpe was eminently calculated to afford. To husband their resources, to devote their time to the best advantage, and to direct their energies into profitable channels, was a work requiring no small amount of enthusiasm and labour. The results of these efforts were, on Friday night last, brought to a highly-pleasing and successful issue. About 400 contributions from members who accompanied Mr. Sharpe in his recent tour, and which occupied three walls of one of Willis's Rooms from floor to ceiling, were exhibited, and drew together as crowded a room of students and architects and amateurs as we have ever seen. Those who were fortunate enough to be present may well wonder how a few days' work in the North of France, devoted primarily to tour-making, could have borne such good fruit. It certainly speaks well for the generalship of Mr. Sharpe and his able *aides-de-camp*.

Mr. Sharpe wisely confined the work of his party to a limited range of country, and to the study of the development of particular periods of French Gothic—namely the Transitional and Lancet. Unquestionably, in the Early French Gothic, as seen in Normandy and adjacent provinces, we have the most characteristic style of the Franks—the Gothic *par excellence*. In the Southern provinces we have the Romanesque in some of its earlier and grandest forms; but few examples of real Gothic exist. The excursions of Mr. Sharpe's party embraced the most important centres of Gothic or Pointed work. Paris is the great centre of this architectural territory. The routes taken appear to have been eminently well selected, no less than the confinement of the members' attention to those details which best typify the varieties of style. We could have wished, indeed, time had allowed of a more general survey of the buildings visited, for it would have been a more complete study if one bay of each church, for example, embracing its plan and section, could have been accomplished; but of course this was quite impossible in the limited time at disposal; and Mr. Sharpe very wisely confined the tourists' study to the carved work—the changing profile of mouldings, and especially the springing of the arch-mould and the capitals and piers. Perhaps few more interesting points could have been chosen, as the pier and capital may be said to present the very essence of the style regarded in its decorative aspect.

Passing in review the sketches exhibited, which were all vigorously etched with black lines, a few of which we produce photo-litho. illustrations of this week, some of them being so effective that they may almost have been mistaken for casts of the capitals themselves, Mr. Sharpe noticed the gradual development of the style from the Romanesque to the Geometrical period. The arrangement on the wall of the sketches in this order made the subject one of special interest. Of the Romanesque work there is very little; this period is a short one in the Northern provinces of France. Among the examples illustrated were

capitals and piers from Poitiers, Evreux, St. Remi, Montmartre, &c. The acanthus leaf is seen worked throughout the Transitional period of this style. St. Remi affords an interesting type. The Transitional style is well illustrated by examples from Chalons St. Eté, St. Denis, Beauvais, Hôtel Dieu, Mantes, St. Vaast, Sens, Senlis, St. Germain, St. Remi, and Laon.

The peculiar forms of some of the capitals, the cushion capitals of Professor Willis, and the corner-knobbed leaf, as at Evreux and in our own Ely Cathedral, are remarkable instances of the change of outline the acanthus type of leaf underwent. At Chalons Ne De we have a beautiful type of this Transitional form. The capital from Laon is also an admirable and simple type of some of these earlier examples of the style. The acanthus form of capital at Canterbury well compares with some of the French, however. There is a greater chasteness and purer form manifest in the more Northern example. Another change of form indicated was the volute of the leaf of capital curved inwards instead of outwards. At St. Vaast there is a good instance of this, the capitals having four leaves, one at each angle. Other instances occur at Chalons, Laon, Beauvais, and especially at the Hôtel Dieu, where there is a great variety. Another variety or change we have yet to notice, in which the leaf has a spatulate or ace-of-spades shape. We give a good example of this in our 6th example published this week from Senlis.

Another peculiar form was pointed out, in which the upper part of the leaf forms a barrel-shaped volute. Some of the shafts of this early period are extremely light, compared with the heavy mass of capital, arch-moulding, and shaftlets which spring from it. The thrust in these cases was, Mr. Sharpe said, thrown outwards; but the great weight on these slender shafts of stone had, in some cases, actually crushed them, though lead and thick layers of mortar intervened at the beds. The next development of the capital was the hollow curve given to the leaf or bell. In the photo-litho. illustrations which we present our readers with this week, we have some admirable examples of this refinement in the capitals of the Transitional or Early Lancet period. At Sens, St. Denis, and Le Mans, the examples are good. The hollow-necked capital was a distinguishing mark of the Transitional, both in France and in England, and the overhanging leaf was generally noticed. Our 1st, 2nd, 5th, and last examples give good illustrations of this kind of capital. At Sens, and the Hospital of St. Cross, we have representative forms of a mixed character.

The Lancet, the date of which Mr. Sharpe gave as 1190, is distinguished by the introduction of leaves of a more compound form, as the oak-leaf, and these had a sprout-like effect at first. The next variety was what was termed a "crocketed" capital, examples of which are seen at St. Vaast, Chartres, Chalons, Laon, St. Denis, &c. The form of base, too, was illustrated by sketches, the usual form being the spurred or angular leaf, of which there are some admirable examples. In the main, fewer changes were introduced in the French Gothic than with us—a continuation of the same general form slightly varied in detail being the prominent characteristic.

There is no doubt that in the architecture of the North of France we have the origin of the Pointed style which spread to every corner of Europe—Germany, England, and elsewhere. From France the style received its first impulse. In the middle of the twelfth century it began to take root. Normandy, peopled by a vigorous and energetic race, soon seized upon the most sturdy elements of the style, and erected buildings which may in very many respects vie with our own. In the character of their mouldings and early tracery we can certainly take some valuable lessons. There is a vigorous simplicity in the treat-

ment of material which in this country is less evident; though at the same time we prefer our own thirteenth-century Gothic in all the higher principles of proportion and form. Mr. Johnson's admirable sketches from the Ile de France have done their share in promoting a feeling for early French architecture; Mr. Sharpe's labours in the same direction will, it may be hoped, tend to give a more settled and definite course of study to the student without leading him to copy the style for the mere satisfaction of knowing it. We hope all Mr. Sharpe's listeners were swayed with the conviction that the artists who have left these early and varied examples were imbued with the true spirit of their work, and disinclined to copy merely. Their labours were one continued effort to adapt their materials, and improve upon their predecessors. There was much in Mr. Sharpe's suggestive remarks that may well be pondered over during the Christmas recess by those who heard him, and who may read the report of his lecture in another part of our impression to-day.

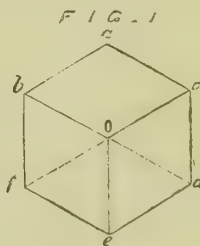
## ISOMETRICAL PROJECTION.

WHEN an architect desires to represent, by drawing, a group of buildings which cover a large area of ground, he usually makes a bird's-eye perspective view of them, taking the point of sight at a considerable elevation above the roofs. This method undoubtedly gives a correct pictorial representation, as far as the point of sight is concerned; but it has the disadvantage of making the more distant portions of the building smaller and less distant than those in the foreground; it is also useless for any purposes of measurement of the actual dimensions of the several parts, and such a view cannot be used by the workmen to enable them to construct the buildings.

The system of isometrical projection avoids these inconveniences, for whilst showing at a glance the general arrangement of the buildings, it also represents all of them in the same proportion as they are intended to be by the designer; we can also apply a scale to measure the dimensions of any part, just as is done with an ordinary plan or elevation.

The principles of isometrical projection are so very simple, and the working out of a drawing so easy, that no elaborate treatise is required to instruct the architectural draughtsman, to whom it will present no greater difficulty than will be found in the delineation of the usual geometrical drawings, since the only instruments required are a T-square and a set-square whose angles are 30° and 60°. In this system we suppose the eye to be placed at an infinite distance in the prolongation of the diagonal of a cube, so that all the projecting lines are parallel as, in a geometrical elevation.

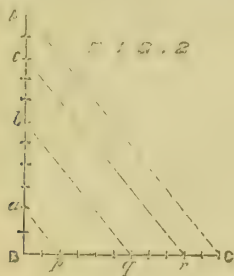
If we draw a regular hexagon, as Fig. 1,



having O for its centre, we shall have an isometrical representation of a cubical building, of which *ef, ed* form the ground line, *O bac* the roof, *O cde* and *O bfe* two of the sides meeting at right angles in the vertical corner Oe. All horizontal lines of the building on the two sides, and in any planes parallel to them, will be parallel to *O b* on one side and *O c* on the other, and can be drawn with the set-square whose angle is 30°, since *O b* and *O c* both make an angle of 60° with the vertical. We see also that the lines *O e*, *O b*, *O c*, which are equa-

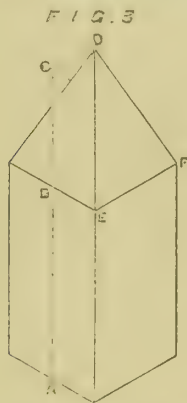


in the cube itself, are also equal to each other in the projection, although reduced in length; so that the same scale can be applied to measure all three dimensions of height, length, and breadth; this scale is very nearly 9-11ths of the original scale of the cube, so that if one edge of the cube measures 11 in., each of the edges in the projection will measure 9 in.; we can therefore make an isometrical drawing of a building from an ordinary plan and elevation by reducing the scale in the above proportion. Draw two lines BA, BC (Fig. 2), at right angles,



divide BA into 11 equal parts, and make BC equal to 9 of those parts, then any dimension as Ba, Bb, or Bc, can be found on the isometric scale by drawing the parallels AC, cr, bq, ap, and will be represented on the isometric scale by the lengths Bp, Bq, Br. The simplest plan, however, in practice, is to make a paper scale with all the dimensions of the plan and elevation reduced in the proportion of 11 to 9, and then the draughtsman has only to measure with this scale on the lines Oc, cf, ed (Fig. 1), the same dimensions as he finds (by the true scale) on the ordinary plans and elevations, and all the features of the building can be indicated in their proper position.

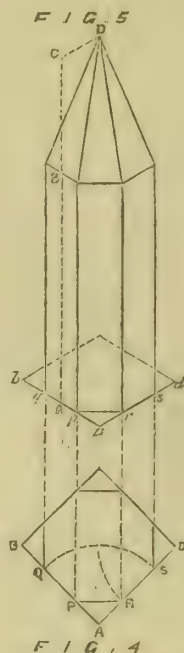
Suppose we have to represent a square tower with a pyramidal roof (Fig. 3), then the position



of the vertex D is found by erecting the vertical ABC through the middle of one side, and measuring, by the isometric scale, AC equal to the total height from the ground, and then drawing CD parallel to EF, meeting the vertical ED in the point D. The method of drawing an octagonal tower is shown on Figs. 4 and 5, Fig. 4 being the correct plan of the tower, of which P, Q, R, S are the angular points, the lines AB and AD making a right angle with each other; in the isometric view (Fig. 5), ab and ad make 120 degs. with each other, but the diagonal bd equals the diagonal BD, so that we have only to draw up the vertical lines from the points P, Q, R, S, and we have the angles of the projection. We may also find the points p, q, r, s, without drawing the octagon at all; for AP is very nearly 3-10ths of AB, and BQ is equal to it; since then ap and bq in Fig. 5 bear the same proportion to ab as the corresponding lengths in Fig. 4 do to AB, we can take ap and bq as 3-10ths of ab, so that the points p and q, r and s are determined by scale.

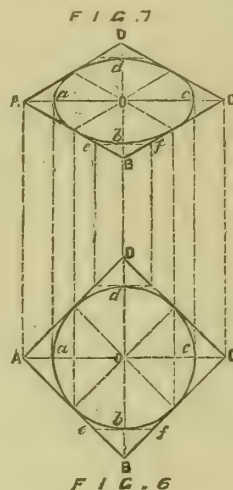
Referring to Fig. 1, the lines Ob, Oc, Oe, are called the *Isometric axes*, and all lines

parallel to them are *Isometric lines*; the centre O is called the regulating point, and the faces Obac, Obfe, Oede, are *Isometric planes*. The diagonal of the cube through the point O



makes an angle of about  $35\frac{1}{2}$  degs. with the horizontal, and all the projecting lines which are parallel thereto must therefore make the same angle with the horizontal.

There is only one other point that requires particular notice, which is the projection of circles or parts of circles; these are always elliptical, as in linear perspective, and the axes of the ellipse can readily be found for any given circle. Let ABCD (Fig. 6) be a



square in which the circle abcd is inscribed, and let ABCD (Fig. 7) be the isometric projection of this square; draw the tangents to the circle at b and d, and draw vertical lines, as dotted, from all the points on the lower figure to the upper figure; the major axis ac of the ellipse will equal the diameter of the circle, and the minor axis in the line BD can be found geometrically by drawing the verticals ee, ff, and the tangents ef, ef. It can also be found by taking Be equal to 3-10ths of BA on Fig. 7, and drawing ef horizontal; or it can be calculated by taking Ob to Oa as 56 to 97. The ellipse will touch the centre point of each side of the parallelogram ABCD (Fig. 7), and can therefore be easily delineated by any of the usual methods of describing this curve.

This method is sometimes erroneously termed *Isometrical Perspective*, because it presents a view of a building in a somewhat similar manner to linear perspective; it has, however, no more right to be called a per-

spective representation than a geometrical elevation has, since we can never actually view a building at an infinite distance, with all the lines of projection parallel. When a mechanical engineer wishes to represent a complicated piece of machinery, so as to exhibit all the parts in one view, the isometrical system is the only one that he can employ; and it is more often applied to this purpose than to any other, since it saves the expense and labour of forming a model of the machine.

#### SKETCHES ON THE LOIRE AND IN THE SOUTH OF FRANCE.\*

"ETCHINGS on the Loire" are a series of artistically-drawn and etched subjects from the Loire district. Mr. George, in presenting us with them, has given a very acceptable companion-volume to "Etchings on the Moselle," published by him last year. Few books will be more welcome, at this time of the year, or more presentable, than the present volume of choice bits gleaned from a beautiful and historic river. The series comprises some twenty picturesque chateaux and other remnants of Middle Age and Renaissance France, sketched three summers back; and in our author's own graphic etchings we lose none of the character of the works delineated, but are sure we possess all the meritorious and artistic points which so frequently elude the transcriptive process of ordinary engraving. Selecting a few of the etchings, the unfinished Flamboyant Gothic doorway of St. Jacques, Orleans (plate 1), is an artistically-rendered fragment of a double doorway. From Blois, we have a spirited sketch of the splendid open staircase built by Francis I. in the spacious court of the north front of the chateau. Its angular pilastered piers, with the balustrade of the winding stair abutting against each pier, and the flat, open Burgundianesque arches deep in shadow, contrast admirably with the delicate carving of its stone. Mr. George says, "Hard it seems that our climate forbids the use of the open arcade or staircase, a feature which gives such emphasis to the French chateaux." The style of the staircase is Renaissance, though some Gothic details are seen. Many dark deeds are connected with this staircase. It led to the apartments where Henry III. summoned the ill-fated Duc de Guise, who was assassinated. Catherine de Medicis died here, after the perpetration of her plans. Louis XIV. sought refuge in this chateau, which afterwards fell into neglect during the Revolution, when the chateau became a powder-magazine. A beautifully-carved chimney-piece in the Chateau de Blois of Louis XII. is a highly artistic etching which we reproduce in our selection this week. Plate IV. is a charming etching of the Chateau and Bridge of Amboise, a favourite haunt of kings. Situated on the left bank of the Loire on a rock, and surrounded by castellated walls, under whose shadow nestle many old houses, and approached by massive bridges, there is much to recall the original character of the spot when the French kings and the Counts of Anjou held it. Louis XII. subsequently made the chateau his home, and at Amboise Francis I. entertained Charles V. Another view shows the rock-perched Chapel of St. Hubert. Cruciform in plan, it stands on a lofty rock, encased with masonry, and appears to have grown out of its lofty pedestal. The chapel has some exquisite carving, its doorway canopy has a panel showing the Conversion of St. Hubert, where the huntsman and dogs are transfixed in adoration before the crucifix between the horns of the stag. The historic Castle of Chenonceaux, built upon a bridge across the Cher, is a fine specimen of Mr. George's etching. There is a gradation of shading and aerial effect very pleasing. Its founder, Bohier, a General of Finance to

\* "Etchings on the Loire, and in the South of France." By ERNEST GEORGE, Architect. London: John Murray, 1875.



Louis XII., had a taste for the Renaissance, which, in this castle, was carried out in splendour and with much refinement. Its flanking turrets, capped with conical roofs, and its highly-wrought dormer gables and high-pitched roofs, combined with its romantic situation upon the river, give this chateau a remarkable air of romanticism. Bohier, to build it, drew largely upon the State treasury, and his son, to partly redeem his father's disgrace, offered it to Francis I., who made it a royal palace. Henry II. gave it subsequently to Diane de Poitiers, who rendered it as sumptuous as she could. Herself fond of art, she invited to Chénouneaux all the genius of her time. It at last fell into the hands of Catherine de Medicis at Henry II.'s death, who constructed galleries of art over the bridge, and employed Palissy to form Italian gardens on the river's banks. Here, among the parterres and glades, the potter introduced fountains of his ware. Tasso, Voltaire, and Rousseau were associated with Chénouneaux. The "Warder's Tower" is a round tower, protecting the draw-bridge, and is, perhaps, about as unique as any of the etchings. We have been permitted to give it in our present illustrations.

From Tours we have a group of timber houses; from Loches a choice bit of the castle strongholds of old France, occupied successively by Romans, Visigoths and Franks, and Counts of Anjou. The tower of Agnes Sorel reminds us of the chivalrous days of yore. Here Agnes Sorel dwelt, and influenced by her heroic character Charles VII., while her charity enriched the monastery. Angers, on the Marne, is one of the rarest of French towns, and is a beautiful etching of the Renaissance Palace Hotel de Pincé, erected by Pierre de Pincé. It displays still a Gothic outline, though its details are Classic. Mr. George has here given a delicate etching of a well-grouped and effective building of the very interesting period of early Renaissance. At Anjou is the historic and grand palace of our Plantagenets, Counts of Anjou. A curious bridge at Cahors, on the Lot, is depicted, and shows us a good example of the old fortified bridge of the fourteenth century. Three lofty watch-towers break the line of bridge, arched underneath for the roadway.

Toulouse is represented by an etching of the interior of the Cathedral of S. Etienne. It shows one of those spaciouly-spanded interiors common in the South. The Flamboyant choir and aisles are here added to the thirteenth century nave of Southern character, vaulted in one span of 62ft., the vault being resisted by immense buttresses. Carcassonne is shown by a view of the citadel. The city is the most archæologically complete, it is said, of all the Mediæval relics of France; its citadel stands on a rocky eminence. The old wall, towers, and bastions of this feudal fortress, backed by the range of the Pyrenees, are grandly suggestive to the artist of romance. We have given it in our selection from this book as one of the finest. The Hôtel de Ville and Cathedral at Narbonne is another highly pleasing sketch, which the author graphically describes. The cathedral, with its flying buttresses is essentially of Northern Gothic design. From Arles we have a choice etching of the cloister and well of St. Trophemus, which forms the subject of our fourth illustration; while the historic city of Avignon is shown in a general view, with its quaint cathedral of Notre Dame, semi-Classic in its details. The bridge and chapel of St. Benazet concludes a very interesting series of sketches. The bridge (of twelfth century) is a fine example of the old masonry bridges of Roman construction; its arches are of wide span and of hewn stone, the chapel being a resting-place standing on the central pier. Avignon was a stronghold of the Popes. The Chateau des Papes combines a palace and a fortress. Our artist has taken the old city from the Rhone. Its round towers, gates and machicolated walls seem to encircle it. The cathedral crowns a rock rising abruptly from the Rhone.

Avignon has been associated with many great and stirring names, Petrarch, Rienzi, and lastly, though not least, our own countryman, John Stuart Mill. The South of France is rich both in its historical reminiscences, art-treasures, and natural scenery, and Mr. George appears to have culled some of the most piquant specimens, and presented them in the most attractive form of etchings by himself. The volume he has thus produced will be a handsome contribution to our libraries and tables, and a most acceptable addition to our Christmas literature.

#### HISTORIC ART STUDIES.

THE RENAISSANCE IN FRANCE, GERMANY, SPAIN, AND ENGLAND.

(With double-page Illustrations.)

NO art period requires to be studied with greater diligence than that of the Renaissance. Its technical designation is, as with many technical expressions, apt to mislead us. Many art students take it for a revival of Greek and Roman art—a supposition altogether opposed to fact. Some Greek and Roman forms and details were undoubtedly brought again into use; but the Renaissance architecture is as new and different from either Greek or Roman as modern thought is different from that of the Greek philosophers, or as the Reformation is unlike Roman Catholicism. Bacon is not Aristotle, and Michael Angelo is not Iktinos. Like everything evolved from the structures of the past through new combinations, so modern architecture is an evolution from older works, but the results are new, striking, and altogether different from the older forms, survivals of which may be traced in them. Gothicism was an outgrowth of Buddhistic forms, not in a literal, but in a chemical sense; the spiritual genesis of the two worships being analogous, the forms became kindred in their combinations and outward signs. The Reformation brought about a new mode of thinking in every direction, in a revived study of the Classics and Oriental literature; in a revived study of the laws of Nature, in philosophy, astronomy, and geography, and art, as the true and genuine reflex of the highest culture of mankind could not remain untouched. The changes it underwent may be studied in the masterworks of the Renaissance period, in all the branches of art. The crooked, mystic, and symbolic Gothic forms had to yield to straight lines, a symmetrical arrangement of the whole, and a more correct decoration of the details. Every nation in Europe felt the force of the new intellectual movement in the sixteenth century, and none could resist it. According to national characters, the Renaissance styles differed as much as the Gothic products. The Italian Renaissance is only in certain forms like the French, which differs from all the others, whilst the Spanish cannot free itself from Moorish and Saracen influences, and in England and Germany Northern clumsiness prevented for a long time a thorough understanding and appreciation of the new forms. There are, and will always be, nations as well as individuals, who are slow—very slow—in understanding the great intellectual and artistic changes wrought by progress; who will advocate the use of flint-knives instead of steel, or of black letter instead of our modern type, or of archaic ornaments and Gothic twists instead of more refined modern patterns. These are the static forces that hinder all advancement, busying themselves continually in trying to turn the wheels of progress backwards; but they are unconsciously carried onward, and serve through their very nature as the most powerful promoters of progress. The Popes Julius II., Leo X., Clement VII., and Pius IV., were so many living examples of this assertion. The works of art through which they hoped to oppose the spirit of modern times are splendid monuments of the Reformation; for the Renaissance fostered by Popes was nothing but the

embodiment of the modern mode of thinking in outward forms. People, ignorant in Sciences, History, and Art, may flatter themselves that they can revive "what was": they will only succeed in certain gloomy circles, where men live on the past. They create a wholesome reaction, but fail to make a lasting impression. In looking at Fig. 1 of our illustration, the Castle of Chambord, we may understand this struggle of Mediæval clumsiness with modern forms. Like a baronial stronghold, rises the gigantic work, with numberless turrets and finials; but the spirit of Francis I. ironically destined it to be nothing but a shooting-box. It stands in silent solitude, like a monster in stone, to enliven a woody desert—a mighty square, flanked by four round towers, 40ft. in diameter, provided with special entrances, no longer to admit prisoners, but well fitted with dining-rooms, boudoirs, and secret staircases, to facilitate love-intrigues, and mysterious meetings. To understand the half-chivalrous, half-modern arrangement of this castle, one must read Rabelais' description of the Abbey of Thelemite. One thousand eight hundred workmen were employed for twelve years in constructing this castle in 1523. Teuton, Gothic, and Greek elements were united to produce an incongruous whole. Arcades, looking like basket-handles, connect the different parts of the building; the pointed arch had to yield to the Roman round arch, and the windows are made square. Their frameworks are ornamented with pillars and columns, in a Greek style. The façade which we give is turned towards the park. The roofs of the towers are richly provided with bow windows. All is confused, but highly picturesque. Stern, admirable in disposition and style, and totally different in conception from the work just described, is the western façade of the Louvre (see Fig. 2), constructed by Pierre Lescot (1510-1578). The whole spirit of Italian taste and excellence is reflected in this French architectural masterwork. The palace was begun in 1541, continued under Henry II., and the cupola over the central entrance was finished under Louis XIII., by Lemercier. Corinthian, Ionic, and Doric elements are used in harmonious union, but where is there a Greek or Roman building that ever resembled this abode of modern kings? The sculptural decoration, chiefly by Jean Goujon, are undoubtedly in a thoroughly antique style; but should we not be allowed to use what has been brought to perfection in art, and should we be compelled to live in holes and dark corners, because Mediæval ecclesiasticism delighted in mystic "chiaroscuro" construction? The French yielded to the reformation in art; we fought it out in spirit—why should we obstinately refuse to recognise it in outward form? Also, why should we try to pander to a spirit of Hebrew-Egyptian gloominess so utterly in contradiction to the spirit of our times? The gallery of Francis I. at Fontainebleau (see Fig. 3) reflects the spirit of French vanity and pompousness. It is overdone and may be considered as a transition into the "baroc" style of Louis XV. The decorative profusion is oppressive, and robs the fine dimensions of the hall of all their æsthetical effect. The decorators were two Italians, Primaticcio and Rosso Rossi. The panellings of walls and ceilings are too rich. The palace was ordered to be constructed as it now exists. Count de Laborde has given us the architectural history of the building. The artists had to follow out strict orders; so that it would be difficult to say how much of what is badly done is due to their want of taste or to the king's caprice. Of the outer pillars the King said that they must be "garnies de chapiteaux de façon bonneste." This, perhaps, meant that the capitals must look respectable. Respectable works of art are, unfortunately, often anything but artistic. For further information on the Renaissance Art in France, we must refer our readers to our article in the BUILDING NEWS, April 21,



1871. Turning now from France to Spain, we find that, splendid as the works of the Renaissance period there are, the Spanish artists could not altogether free themselves from older influences; and we may, at the same time, learn that whilst yielding to the spirit of modern times, we may be able to use older combinations and still be just to the demands of better taste and more congenial forms. The entrance to the new chapel of the Cathedral (see Fig. 4), as also the principal staircase of the Santa Cruz Hospital, both at Toledo (see Fig. 5), are rich and grand. The former was constructed under Charles V., according to the plans of Alonzo de Covarrubias, of Alvaro Monegro (1531-1533), and decorated by Melchior Salmeron and Diego of Egas. Arches, panelings, "cassettes," and niches with statues abound, but a masterly soberness may be traced in the whole arrangement. The courtyard of the hospital of the Santa Cruz, constructed 1504-1514, by Henry, the father of Diego of Egas, who was of Flemish origin, is less powerful, the arches of the arcades being rather low. In Germany and England the Renaissance had to encounter greater difficulties than in Italy or France. Individualism and particularism in religious sects or political parties were opposed to an art-form which peremptorily demands a symmetrical subordination of all the details under a general plan—an art in which the fundamental principles of Greek art are again brought with æsthetic correctness into reality; in which architect, decorator, and painter must work together to produce a congruous artistic effect. The Town-hall of Cologne (see Fig. 6) exhibits, in its peculiar mixture of Gothic and Italian elements, the struggle against the adoption of a pure Renaissance style. The round-arched arcades of the ground floor are surmounted by windows with pointed arches, placed between projecting clusters of, and isolated, Corinthian half-columns. The curved sides of the high roof are also ugly in shape, reminding us of the tall roofs of the Mediæval houses, and peculiarly contrast with the Italian parapet running round the building. Gorgeous and imposing are the façades of the Castle of Heidelberg (see Figs. 7 and 8.) The first was built by Otto-Henry, 1556-1559, according to a plan of Michael Angelo, and the second by Frederic IV. in 1601-1607. Caryatides, niches with statues, cornices, consoles, pilasters, and half-columns abound, and give the whole an imposing aspect. The statues represent mythological, Scriptural, and historical figures; a welding of the Classic, Christian, and modern historical spirit is reflected in the façades of this castle. The façade built by Frederic IV. in many respects deviates from the grander plan of Michael Angelo. There is a marked tendency to over-decoration; some of the pilasters are suddenly broken off and their capitals replaced by niches, filled in with statues. The vain attempt to out-do the good, instead of keeping within the boundaries of a plan drawn by a genius, brought about these mistakes. Characteristically sober and simple is our last specimen of English Renaissance (see Fig. 9) part of Wolleton House, constructed by John Torpe, 1580, or more probably designed by John of Padua, and executed by James Smithson, who was his master-mason, and suddenly became an architect. (See Hackewell, "An Attempt to Determine the Exact Character of Elizabethan Architecture." London, 1835). The Elizabethan style is nothing but a bad translation of the Italian Renaissance into indifferent English "slang." We must strongly advise students of art to make themselves acquainted with the genial and original buildings of Italy, instead of trying to revive poor and misunderstood transcripts. The best plan, however, is to go back to the sources which the Italians used, that is to the pure Classic Style, and, thoroughly conversant with these originals, to work out new forms independently, in their spirit, bearing in mind the require-

ments of our times—light and air, straight lines and simplicity, without meanness of decoration. From sciences and arts all national exclusiveness and narrow-mindedness, all belief in peculiar capacities, should be eliminated. A disproportionate, national egotism in art leads to no progress. In the defence of our shores, let us be patriotic if we are attacked. In sciences and arts we must embrace humanity at large in all her attainments. Exclusiveness in art-matters means bad taste, and a neglect of the very highest results of human culture.

G. G. ZERFFI.

#### NORTHERN ARCHITECTURAL ASSOCIATION.

A MEETING of the Northern Architectural Association was held on Wednesday evening, the 16th inst., in the Old Castle, Newcastle, Mr. Matthew Thompson in the chair. A paper was read by the Chairman, who congratulated the Association on this its sixteenth anniversary. He hoped the committee would consider some scheme for the higher education of the architectural student; the school of art unhappily did not include in its course of study such subjects as were really serviceable to the architectural student. He referred to the subject of architectural competition (or the modern notion of the best way of obtaining a qualified architect). Year after year they had glaring instances of the unfair treatment of competing architects. Conditions were issued which were most binding and arbitrary; and yet, when the conscientious architect had complied with these in every particular, he was disgusted to find that his efforts had been in vain, and that nepotism or favouritism had triumphed over the most successful skill and honest endeavour. It had been suggested that architects should, as a body, make a united stand against the system of public competitions. A letter was read from Mr. Tone, with reference to Corporation officials practising otherwise than in connection with their own private business, and it was referred to the committee to report upon. The Chairman called attention to the difficulties connected with the by-laws of the town. Mr. Kyle thought the Town Improvement Committee should consult with the architects and builders of the town with respect to the by-laws. Mr. G. W. Hodge said that the subject had been referred to a sub-committee of the Town Improvement Committee; and he promised to inform the secretary of what was done. The officers for the ensuing year were elected as follows:—President, Mr. John Johnstone; vice-president, Mr. Thos. Prosser; treasurer, Mr. W. H. Dunn; secretary, Mr. Thomas Oliver; solicitor, Mr. G. W. Hodge; committee: Messrs. M. Thompson, G. Kyle, J. Hogg, W. Peachy, G. Connell, J. W. Shotton, Thos. Reay, and F. Charlton.

#### PROPOSED NEW STREET IN THE CITY.

AT the meeting of the Court of Common Council on Thursday week, Mr. Alderman Knight, Chairman of the Improvement Committee, moved the adoption of a report of that committee on a reference to them of the 26th of February last, upon the petition of owners and occupiers of the wharves, warehouses, offices, and dwelling-houses in the Ward of Billingsgate, relative to the traffic in Lower Thames-street, and urging the court to take steps for widening the existing thoroughfares, or the construction of a new street or streets in that locality, and with plans in reference thereto. Mr. Knight dwelt at some length on the urgent and constantly increasing need, particularly within the last ten or twelve years, for adapting the thoroughfares in Billingsgate and its neighbourhood, and how the matter had been again and again urged on the attention of the Corporation by all the leading merchants and other persons of consideration in that part of the City. In 1862, he said, the late City architect, Mr. Bunning, estimated the cost of widening Lower Thames-street in one direction at £300,000. Finding that to be a hopeless enterprise, another was then suggested at an estimated cost of from £700,000 to £750,000. One proposal had since contemplated the removal of the Monument. That was thought at first to be an untenable suggestion, but it improved on acquaintance, as one alternative, and

the present City architect simply proposed to shift the structure, but only a few yards, where it would still be as much seen as now and make room for a very commodious street. Another plan submitted to the committee would give a shorter thoroughfare, seeing that it would start east of the Monument. It would only be 55ft. wide, but there would be room for two lines of traffic on each side of the Monument. It could not, however, be constructed in these times for less than £525,000; but, if it had been undertaken twelve years ago, the cost would only have amounted to about £88,000. By such an expenditure, however, the public would have a grand thoroughfare, extending from King William-street to Tower-hill, and that without making a circuit round the Monument, as was at one time proposed. It might be that the Government would be disposed to assist the Corporation in the cost of constructing such a thoroughfare, seeing that it would not only facilitate the general traffic, but also accommodate that to and from the Custom House, the Tower, and other public buildings in that locality. Mr. Alderman Knight concluded by saying, in effect, that the report of the committee, which he was now submitting for approval, embracing various alternative plans for relieving the traffic in that part of the City, was signed by upwards of 20 members of the committee, and that the question of funds had not been submitted to them, it being a matter for the consideration of the whole court. He threw out a suggestion that it might be a subject for the application of some part of the coal duties. He moved that the Court agree with the report of the committee, and that it be referred to the Coal, Corn, and Finance Committee, with power to confer with the Improvement Committee to consider how the necessary funds are to be raised. Mr. H. A. Isaacs, as an amendment, moved that the proposed new street would not afford such increased facility to the traffic of Lower Thames-street as would justify the Court in undertaking its construction, at the estimated nett cost of about £525,600, which sum, if borrowed at a maximum of 4 per cent., would be equivalent to a charge of £21,600 a year in perpetuity; and that the report be referred back to the committee, with an instruction to them to consider some comprehensive means of improving the traffic accommodation of the City, and report thereon. This amendment was carried.

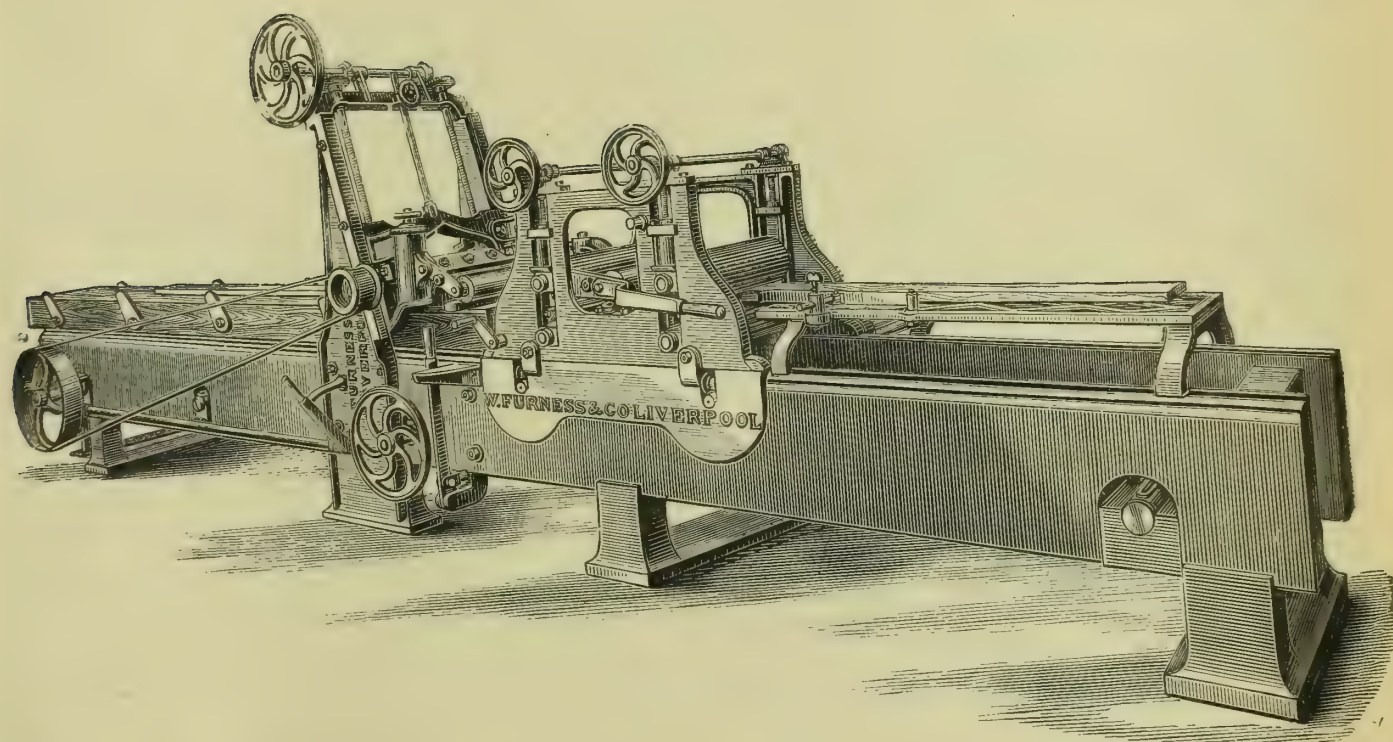
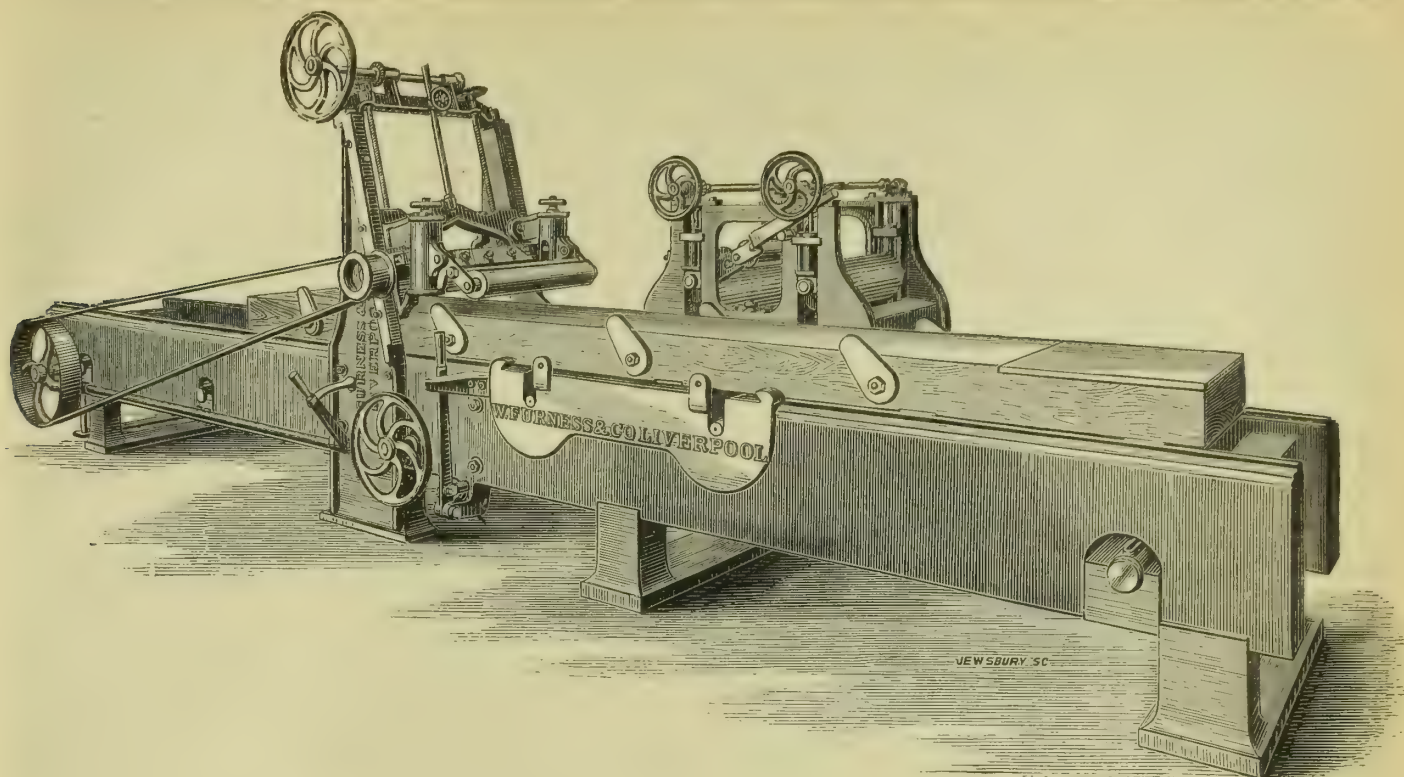
#### MR. GILBERT SCOTT ON CHURCH ARCHITECTURE.

THE first of two lectures given at the Leeds Church Institute on "Church Architecture," by Mr. G. Gilbert Scott, F.S.A., was delivered on Wednesday week. An examination of the respective types of architecture, he said, brought them to the conclusion that the best and most convenient styles had been adopted—a result they had every reason to feel proud of, as there had thus been secured the largest accommodation consistent with the comfort of worshippers and the convenience of those officiating—the plan adopted by Sir Christopher Wren at St. Paul's, London, being very much eulogised.

In the second lecture, delivered on Thursday week, Mr. Scott confined his remarks chiefly to the architecture of the Saxon period. What he wished particularly to show was that in Britain we have a continuous church history; and that though largely indebted to the Roman missionaries and the Normans as regards church architecture and ecclesiology, we did not derive from them our earliest traditions. In the earliest ages of the faith there existed in Britain a simple type of church building distinct from that of Rome or Constantinople; and we saw this type maintaining itself against the foreign fashions imported by the Normans, and imparting to the English churches throughout the whole of the Middle Ages a character which was distinct from that of the rest of Christendom. It was not, however, architectural style but ecclesiastical type that we inherited from these primitive British churches.

On Thursday last the ancient parish-church of Bassenthwaite was reopened, after undergoing in part a restoration, but in the main a rebuilding. The cost of the works, which have been carried out from the designs and under the superintendence of Mr. Watson, architect, Penrith, is about £1,200. The scheme of the window was suggested by the architect of the church, and has been designed and executed by Messrs. Powell Bros., of Leeds.





#### TRYING-UP AND FOUR-CUTTER PLANING AND MOULDING MACHINE.

WE illustrate above a new wood planing and moulding machine just introduced by Messrs. Wm. Furness & Co., woodworking machinists, Globe Ironworks, Liverpool, for the combined purposes of dimension planing or trying up, and planing on all four sides, timber of any length, and up to a width and thickness given. In our first illustration, the machine is shown adapted for trying-up or planing perfectly level and out of winding a piece or pieces of timber up to 20ft. long, 20in. wide, and 16in. thick. This is done in the ordinary way by revolving horizontal cutters, driven by two bands, one on each side of the machine, the table with the timber travelling under the cutters at the desired rates of feed, a quick return motion being provided for bringing back the table. The novel part of the machine consists in the feed works, which are here shown to be behind the table. These feed works are formed of four calender

rollers powerfully geared, between which works the bottom cutter-head driven from a countershaft fixed to the framing of the machine. The side cutter-heads are in advance of the second pair of feed-rollers, and are also part of the feed works. One side cutter-head is a fixture, and the other is worked in or out on slides by means of a screw. It will thus be seen that the feed works comprise the feed rollers and necessary driving gear, bottom and side cutter-heads, and pressure rollers, &c. The whole is carried by four grooved friction rollers running on two turned rods supported by the framework of the machine and a bracket at the back. When it is desired to use the feed works for tonguing and grooving, moulding, or planing, all four sides of the timber at once, the table of the machine is run forward till the end is almost under the top cutter-head, when the feed works can be easily drawn across the framework of the machine, as shown in our second illustration. It fixes itself in V slides, and the bands for bottom and side cutter-heads having been placed on their respective pulleys—which are

fixed on the ends of the spindles, so that no lacing or fastening is required—the machine is ready for work. It will work any size of timber up to 4in. thick and 12in. wide. By the removal of the side cutter-heads, which is a very simple operation, surfacing or panel planing can be done by the top cutter-head alone up to 20in wide. A very important feature of the machine is the rapidity with which the feed works can be removed when the machine is required for trying-up purposes, about five minutes being required. A great advantage, and worthy of attention, in this combination of two efficient machines is that they only occupy the same space as one machine, and only require one pulley upon the shaft of the mill to drive them.

One of these machines has just been fitted up at the works of Mr. J. T. Chappell, builder and contractor, of Steyning, Sussex, and Westminster, London, S.W., who is highly pleased with it. It appears, indeed, to be a most useful combination of wood-working machines, and is well suited for small establishments and the colonies.



## CONCRETE BREAKWATERS.

At the ordinary meeting of the Institution of Civil Engineers, held on the 15th instant, Mr. Thos. E. Harrison, President, in the Chair, the first Paper read was on "The New South Breakwater at Aberdeen," by Mr. William Dyce Cay, M. Inst. C.E.

The New South Breakwater formed part of the scheme of improvements now being carried out by the Aberdeen Harbour Commissioners under the Act of 1868, and was completed in the autumn of 1873. After describing the object of the breakwater, and the design upon which it was originally commenced, the author observed that in carrying out the work, various methods of building with concrete in a liquid condition deposited *in situ* were tried. The results proving satisfactory, the original design was to some extent departed from, and the portion of the work in deep water was executed in the following manner:—The foundation, after the loose material had been removed, was laid with large bags containing liquid concrete; the work was then carried up with concrete blocks, of from 10 tons to 24 tons each, to 1 foot above low-water of ordinary neap tides, from which level to the roadway, a height of 18ft., it consisted entirely of liquid concrete deposited *in situ*. The toe of the breakwater was protected by an apron of bags, each containing about 100 tons of liquid concrete. Near the shore the foundation rested on rock, then, for a space of 100ft., on boulders and gravel, and the outer portion was clay mixed with gravel and covered with large stones. The bags containing the liquid concrete were deposited in the foundations from iron skips, the bottom of which opened on hinges by the action of a trigger, and so discharged the bags. Three skips were used, two holding  $5\frac{1}{2}$  tons of concrete each, and one 16 tons. The method of working was as follows: A bag of the same shape as the skip, but rather larger, was fitted as a lining to the skip and temporarily lashed at the top; the bag was then filled with liquid concrete, the temporary lashings were removed, the mouth sewn up, and the skip with its contents lowered by a crane to the divers. The skip was then moved in obedience to signals until suspended close above the required position, when the trigger was pulled from above by a rope, which released the bottom of the skip, and the bag was deposited. The divers subsequently prepared the surface of the deposited bag to receive the superincumbent blocks. The proportions of the concrete most suitable for this work were 1 of cement to  $2\frac{1}{2}$  of sand and  $3\frac{1}{2}$  of gravel. The sea staging consisted of a solid timber framework supported on Oregon pine masts, which rested on cast-iron shoes, each weighing  $11\frac{1}{2}$  cwt., and having a socket on the upper side to receive the foot of a mast. The sole of each shoe was a flat octagonal plate 3ft. 8in. across. The top of each mast had a cast-iron cap, with a socket 4ft. deep, the upper side being a flat, triangular table, measuring 6ft. 10in., by 6ft. 2in., to which the timber superstructure was fitted. The weight of each cap was 32cwt. The superstructure of timber girders was composed of large logs keyed and bolted together, no trusses being used, and the whole was braced with ties and struts, and, for additional security, tied to anchors. It was stated that a length of 108 lineal feet of the staging had been erected in four weeks. As the staging was only 27ft. wide, while the breakwater was 35ft. wide at the top, the masts were built in as the work progressed, and only as much staging was used in the sea in advance of the work as was necessary for carrying on the building operations. No damage has been done to the staging, either by the sea or by ships, during the progress of the work. Only a length of 360ft. of the superstructure was required, for, as the building was advanced, the staging in the rear was taken down and re-erected in front. There were two 25-ton steam Goliath cranes with overhanging ends for the building work, and one 3-ton steam derrick for erecting the staging. The cranes were taken ashore in winter and in bad weather by a carriage running on rails on the breakwater.

The system of building with liquid concrete deposited *in situ* above low-water level was then described. A framework of posts was erected round the space intended to be filled, excepting at the end of the completed work, which formed one side of the case. These posts had grooves in their sides, with sliding panels, extending from post to post. The bottom and sides of the case were lined with jutebagging, and tie rods, extending through the posts and from side to side, prevented the case from being burst open by the

lateral pressure of the liquid concrete. In executing the concrete building *in situ* above low-water level, it was considered important to exclude the tide from the unset concrete. To effect this the cases were arranged of such a size that, by commencing when the tide left the foundation of the piece, the concrete could be filled into the case faster than the tide rose, so that its surface was always above the level of the sea outside the case. To hasten the work, concrete blocks were sometimes incorporated with the liquid concrete. The contents of the cases in 1872 and in 1873 varied in weight from 335 tons to 1,300 tons. The proportions of the concrete found best for this work, keeping in view the risks from storms, had been 1 of cement to 3 of sand and 4 of gravel. Bags of concrete, containing 100 tons each, were deposited in the apron after the other parts of the building had been erected, by fixing a large timber box on brackets overhanging the site where the bag was to be discharged. The inside dimensions of the box were 32ft. 1in. by 8ft. 1in. by 6ft. deep; and the 100-ton concrete bag was filled in the same manner as the bags in the small skips. When full the bottom of the box, which opened on hinges placed at one side, was let go by pulling two triggers which held up the other side of the bottom, and the bag of concrete was dropped into the site excavated for it, close to the toe of the foundations of the breakwater. The outer end of the breakwater had been secured against the sea by dovetailing the concrete blocks into one another, and by erecting a tower of concrete, 20ft. high, on the end to add weight to it. The diving work had all been executed with the helmet apparatus; there were generally twelve divers under water at one time, and four shifts of diving work of four hours each were obtained per day in summer. A description was then given of the concrete blocks and the machinery for making them, with particulars as to the concrete mixing and the cement used. The proportions of the materials were 1 of cement to 4 of sand and 5 of gravel. With respect to progress and cost, it appeared that from the time the machinery was fairly at work, about 300 lineal feet had been completed per annum; and that, taking into account the value of the plant now being used on another of the Aberdeen Harbour works, the cost had not exceeded the estimate. The total length of the breakwater was 1,050ft. and on this £76,443 had been expended. In conclusion the opinion was expressed that concrete blocks of the ordinary size of from 10 tons to 20 tons each were not suitable for building a solid breakwater on sand or other soft material, and it was recommended that the parts of such a work below low-water should be in blocks of from 100 tons to 200 tons weight each, and that some of these blocks might with economy and advantage be deposited in a liquid state in bags.

The second paper read was on "The Extension of the South Jetty at Kustendjie, Turkey," by Mr. George Lenton Roff.

This jetty, previous to its extension, was 450ft. long, and was protected against gales by a mole of pierre perdue and concrete blocks. The design for the extension was governed by the following points. It was to be regarded as a breakwater, to be so constructed as to avoid the necessity of lengthening the mole, and the existing traffic accommodation and loading-berths were to be interfered with as little as possible. These considerations made large concrete blocks necessary, and restricted the space available for operations to the last 50 yards of the existing jetty. The design adopted was that of concrete blocks, weighing about 30 tons each, resting upon pierre perdue. The blocks formed an integral portion of the cross section of the work, and were in tiers of four, lying evenly one upon the other, each leaning back upon the preceding tier at an angle of  $47^{\circ} 45'$  with the horizon. The bottom blocks, 18ft. long, were at a depth of 16ft. below the surface of the water. All the blocks were 6ft. high and 5ft. wide; and the top of the work was 11ft. above the water, and 12ft. wide. Three roads on the old jetty accommodated trollies 26ft. long, the blocks being moulded upon the trollies on the outer roads. The timber sides of the moulding boxes, the T irons for stiffening the sides, and the tie-rods for holding them together at the top, were all separately and easily removable. A travelling platform, wide enough to fill up the space between the two rows of blocks, occupied the middle road, and upon this platform the concrete was mixed by hand. A description was then given of the construction of the blocks,

of the arrangement of lifting bolts to insure the tilting of the blocks to the proper position when lifted, and of their subsequent removal. Two trucks of broken stone were placed before, and one of sand and one of cement behind, the platform; the sand and stone being passed by baskets into empty cement-casks, standing upon the edge of the platform, so as to insure the use of regular quantities. The stone was raised and broken by contract at a cost of 2s. per cubic yard. Most of the sand was brought by vessels as ballast; but when a suitable supply failed for a time, it was procured from the seashore. With strong, sharp sand the proportions used for the blocks were  $5\frac{1}{2}$  broken stone,  $2\frac{1}{2}$  sand, and 1 cement. With the native sand, these quantities were altered to 5, 2, and 1. The gantry, carrying a travelling winch, was of timber. The piles, sills, and rail-bearers were of creosoted red pine, and the uprights and braces of Transylvanian white pine. The piles were driven until, being upwards of 6ft. in the ground, they did not penetrate more than 2in. under the blow of a 12-cwt monkey falling 12ft. The piles were 12ft. apart; every third pile was made fast to an anchor, and four or five bays were erected at a time, the timbers being taken down and carried forward as the work progressed. The blocks were pulled forward as far as a traverse, at the end of that part of the old jetty upon which they were built, by a winch fixed underneath the traverse; and thence to the gantry by another winch placed upon the blocks already lowered. While the second winch was pulling the block from the traverse to the gantry, the first was employed in moving forward the remainder of the row, to make room for the empty trolley behind. Stones of  $\frac{1}{2}$  to 1 cubic foot were thrown over the bottom, and arranged previous to the deposition of the blocks. The block, having meanwhile been brought over the spot on which it was to be placed, was tilted up on edge by the act of lifting, and as soon as it hung free the empty trolley was drawn from under it. The beams and rails upon which it had stood were then pulled back out of the way; the block was turned half round so that its length was transverse to the direction of the jetty; and it was lowered into position. The under side was finally packed by the diver as closely as possible with stones, and the lifting bolts were withdrawn. The inclination adopted for the tiers was determined from experiments with a model. It was just sufficient to bring the centre of gravity of each block above the face of the block against which it leaned, so as to prevent any tendency of the blocks to tip forward during settlement. The concrete slope at the end of the old jetty, against which the first tier of blocks rested, was made by lowering unset concrete into a caisson. The sides of this were two thicknesses of planking, with a layer of tarpaulin between. The caisson was finally secured by driving piles formed of two rails riveted together, and tipping stones on their sea face to a few feet above the water level. The water was not pumped out, but the concrete was lowered in hopper-bottomed boxes. The topping of the blocks was done in lengths of four tiers, or 28ft. The plank casing was supported by struts fixed to walings bolted to the gantry piles. The concrete was mixed on the spot, and thrown in. The proportions were  $6\frac{1}{2}$  broken stone,  $2\frac{1}{2}$  sand, 1 cement, and stones from  $\frac{1}{4}$  to 1 cubic foot, equal to about 1 more, making about 11 to 1. The stability of the blocks was tested by leaving five tiers untopped from September, 1872, to July, 1873, at the then extreme end of the work. They were exposed to very heavy seas during the winter; but none of them were disturbed, except by ordinary settlement. To secure the end of the jetty from excessive settlement, the soft bottom, beneath the last seven tiers, was removed to a depth of from 3ft. to 4ft. by dredging, and blocks were placed as a footing to the last three tiers. The weight of each length of topping was 200 tons. The total length of the pier was 253ft. 6in.; and the total cost, including that of the plant, had been about £13,000. The blocks in every case settled vertically, without disturbing the line of direction, the only effect of settlement being to open the joints of the concrete cap; and the slight openings at these points could easily be filled up with cement. The original design was by Mr. Liddell. The work had been executed by the Author for the Danube and Black Sea Railway and Kustendjie Harbour Company, Limited.

A new iron "Free Church of England" was opened on Wednesday week at Southampton. Mr. Kent was the builder.



## COMPETITIONS.

**ABERYSTWYTH.**—**VICTORIA-TERRACE.**—At a meeting of the Town Council, held on the 15th inst., plans were received from the following architects: Messrs. Murray and Thomas, Liverpool; Walter W. Thomas, Liverpool; F. C. Boughton, London; Thomas Shaw, London; E. Bays, London; J. W. Beaumont, Manchester; E. Creuse, Warminster; W. H. Spaul, Oswestry; R. G. Thomas, Menai Bridge; George Jones and Son, Aberystwyth; J. Davies, 61, Terrace; and Szlumper and Aldwinckle, Aberystwyth and London. After reading the letters and inspecting the plans, the Council selected the designs prepared by J. W. Szlumper, Aberystwyth, and T. Aldwinckle, London. "It is generally supposed," says a correspondent, "that, although the Council advertised for working drawings, they have purchased, at the low figure of £10, one of those competition drawings, prepared, etched, or coloured in the most artistic style on short notice and moderate terms. It is to be hoped that this wise Council will give this great bargain of a picture a prominent place in their Art Gallery. I suggest on the line, alongside of some of their magnificent and valuable works of art."

**BUNTINGFORD, HERTS.**—The Buntingford Sanitary Authority some time back advertised for, and obtained from various engineers competitive schemes for the sewerage of the town and disposal of the sewage, and after the usual time spent in deliberation, decided upon one submitted by Messrs. Smith and Austin, sanitary engineers, of Hertford. Working drawings have since been prepared and sanction obtained from the Local Government Board for a loan of £1,600, the estimated cost of the works. Delay in the progress of the scheme has been occasioned by the difficulty experienced in obtaining the only piece of suitable land on which the sewage could be carried by gravitation, and the sanitary authority is now applying for a provisional order to take by compulsion six acres of land, the property of Sir Henry Lushington. The town of Buntingford being situated upon the River Rib, a tributary of the Lee, is compelled by a special Act to stop the flow of anything not being perfectly pure into the natural watercourses. It is proposed by Messrs. Smith and Austin, the engineers to the Buntingford sanitary authority, to re-sewer the whole of the town with earthenware pipe sewers, retaining the present sewers for the purpose of carrying away the surface and storm waters; to conduct the sewage by gravitation to land lying several feet above the line of saturation; and, after passing the sewage through a simple filter and precipitating tank, to utilise and purify it by surface and downward filtration. We understand the works are to be carried out during the coming spring.

**DESIGNS FOR INDUSTRIAL DWELLINGS.**—A few weeks back we referred to the receipt by the Improved Industrial Dwellings Company (Limited), of which Sir Sydney Waterlow is chairman, of twenty designs for the erection of dwellings for the working classes, on a large estate in Goswell-road, leased to the Company by the Marquess of Northampton. The Directors of the Company met on the 21st inst., and awarded the first premium of £250 to Mr. Henry Macaulay, of Elm Bank, Kingston-on-Thames, for his design marked "Salutaris," and the second premium to Mr. Banister Fletcher, of 32, Poultry, for his design marked "Self-contained." Four other designs received commendation. The Directors were assisted in their investigations by Messrs. Charles Barry and George Godwin, who, with Mr. A. Waterhouse, kindly placed their valuable services at the disposal of the Company. In soliciting these designs, the Directors made "economy of construction combined with strength and durability" a primary condition of the competition; but they are of opinion that the cost of construction, if any of the designs sent in were carried out, would much exceed the general cost to which the Directors have hitherto felt themselves restricted, regard being had to the means of the working classes.

**THE MARGATE DRAINAGE COMPETITION.**—A meeting of the Corporation was held on Tuesday week. Two letters were read from Messrs. Gotto and Beesley. In the former they stated that they had no objection to having their amended plan opened, providing the Council forwarded it, with Mr. Lewis Angell's, to Sir Joseph Bazalgette or any other engineer whose standing in the profession was equal to theirs. The letters were referred to the Sanitary and Drainage Committee. The next communication discussed was

a letter from Mr. Lewis Angell, dated the 10th December. The writer acknowledged the receipt of the following resolution of the Council:—"That the amended plan of Mr. Lewis Angell does not satisfy this Council, and is not such as the Council feel justified in forwarding to the Local Government Board for approval." He complained that he had not been favoured with the reasons for this resolution. He contended that the plans he had supplied contained all that the Local Government Board required, and complied with the Council's resolution. He complained of the course the Council had adopted in the matter, and pointed out that, after having been officially invited to enter into the competition, their own referees had awarded him the first place in the competition. A letter written by Mr. Lewis Angell to the surveyor was then read. The writer complained of the treatment he had received at his hands. The surveyor read his reply thereto. In it he said he stated at the Council that a copy of his report on Mr. Angell's amended plan had been forwarded him as soon as it was printed. In any remarks he had made on that subject, he had always endeavoured to act fairly and not to forget the position he occupied in connection with the Council of Margate. He had received a telegram from Mr. Lewis Angell, stating that the letter had been received; but not the report by which it was accompanied. The town-clerk stated that he had forwarded the report to the competitors. It was decided that the receipt of Mr. Angell's letter should be acknowledged.

## ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETIES.

**NORTHAMPTON.**—The annual meeting of the Northampton Architectural Society was held on the 14th instant. The annual report and financial statement were read. From the latter it appeared that the receipts had been, in all, £212. 12s. 4d. for the year ending September 30, 1874, and the payments £50. 4s. 1d., leaving a balance in favour of the Society of £162. 8s. 3d. But, since the end of the financial year, £50 had been transmitted from the current account to the deposit account, which would leave a balance in hand of £112. 8s. 3d. The former officers of the Society were re-elected. Mr. S. Sharp then read a paper, entitled, "Historical Notes of Dallington, with an account of its Church," and the Rev. R. S. Baker another, on "The Ircchester Bowls."

## SCHOOLS OF ART.

**CRYSTAL PALACE COMPANY'S SCHOOL OF PRACTICAL ENGINEERING.**—On Saturday afternoon the prizes and certificates awarded for proficiency during the winter session of 1874 were distributed to the successful students. From the report it appeared that 26 students had obtained a sufficient number of marks for lecture questions to enable them to enter themselves for examination upon the subject of "Materials and their manufacture," and that of these 16 had passed. Ten students in the drawing-office, ten in the pattern-shop, and nine in the fitting-shop also received certificates. In the Civil Engineering section two gentlemen satisfied the examiners in general surveying and the preparation of plans and estimates for Parliament, and five in the calculation of strains and the preparation of general and working plans, specifications, and estimates for a railway and dock. In concluding their report, the examiners spoke very highly of the satisfactory progress made under the efficient and practical system of instruction carried out by Mr. Wilson.

**EDINBURGH.**—The prizes gained by students in the School of Art carried on under the auspices of the Board of Manufactures, were presented last week. The report stated that the number of students who have attended the school for the year 1873-4 is 731, which is the largest number that has ever been received. In the national competition of the year, which is the highest competition of the Science and Art Department, the prizes gained have been:—Male School—2 silver medals, 2 bronze medals, and 7 Queen's prizes. Female School—2 bronze medals. This return shows the female school to have been more successful in the national competition than it was in the previous year. At the second grade examination held in Edinburgh in May, the number of students who presented themselves were, from the male school, 90; from the female do., 130. Of the 90 students from the male school, 57 were

successful in passing one or more exercises, and 13 were awarded prizes of books, boxes of colours, instruments, &c. Of the 130 students from the female school, 71 were successful in passing one or more exercises, and 12 were awarded prizes of books, colours, instruments, &c. In the third grade examination, which is conducted in London by the works of students being sent there, the number of students successful in gaining prizes were:—From the male school, 28; from the female school, 16; and out of the works so sent there were selected for the national competition: From the male school, 28; from the female school, 11.

**LINCOLN.**—The annual distribution of prizes to the students of the Lincoln School of Art took place at the School-room, Silver-street, on Tuesday week. The Government awards for the present and for last year are as follows:—National competition, 1873, 3 Queen's prizes; 1874, 1 bronze medal, 2 Queen's prizes. Third grade prizes for highly meritorious work, 1873, 19 awards to 18 students; 1874, 27 awards to 16 students. Advanced work selected by the examiners for the National competition, 1873, 20; 1874, 29. Free studentships, 1873, 4; 1874, 5. Second grand prizes for freehand model drawing, geometry, and perspective, 1873, 15; 1874, 19. Certificates for ditto, 1873, 61; 1874, 67.

## BOOKS RECEIVED.

*Economic Geology*, by DAVID PAGE, LL.D., F.G.S., &c. (London: W. Blackwood and Sons) is the first attempt to provide a general treatise on geology in its numerous relations to the arts and manufactures. It will undoubtedly be useful to the builder or civil engineer, as it contains much matter relative to materials used in construction. —*Studies in Design*, by Dr. DRESSER (London: Cassell, Petter, and Galpin) has reached us—or rather its first instalment, consisting of three original studies in coloured decoration. The first strikes us as the best. We shall have more to say about this work when a few more parts are published. —*The History of the Lifeboat*, and *its Work* (London: Macmillan and Co.), by R. LEWIS, Secretary of the Royal National Lifeboat Institution, has reached a second edition. —*Lives of the Engineers*, by SAMUEL SMILES (London: John Murray). A new revised edition of this popular series is announced, and the second and fourth volumes, dealing respectively with Harbours, Lighthouses and Bridges, and the Steam Engine, have reached us. —*Warming and Ventilation*, by THOS. C. HINE (London: Hamiltion, Adams, and Co.) is a reprint of a paper read before the Nottingham Architectural Association during the session of 1874.

**THE INSTITUTION OF CIVIL ENGINEERS.**—On Tuesday night this Institution held its annual general meeting. The annual report read showed in every department a readiness to meet the growing wants of the profession, and to acknowledge the spirit of the age. The finances appeared to be in the most flourishing condition, and the Council have determined to further extend their usefulness by creating a series of scholarships, of £40 each, tenable for three years, as a reward for the best paper written by some student. They have also determined to greatly enlarge the well-known "Minutes of Proceedings," and include in them original articles on engineering subjects, as well as abstracts of papers relating to engineering science in foreign Transactions and periodicals.

**THE PROPOSED GREAT ASIATIC RAILWAY.**—The results of the exploration of M. Victor de Lesseps and Mr. Stuart, with the view to the formation of a great Asiatic railway, are reported to be that of three tracings theoretically practicable, only one is possible, on account of the condition of the people through whose midst the line would have to pass; this starts from Lahore, follows the river Yarkand, through the capital of Turkistan, which contains 200,000 inhabitants, Tachkent, Orenbourg, and Moscow. This tracing is said not to present any danger or difficulties. The tunnels which would have to be pierced through the Himalayas would require less labour than that of Mont Cenis, as the stone is not so hard, and though the altitudes would be great the inclines would not be severe. Yarkand, the point of junction of the Anglo-Indian and proposed Central Asia Railway, would also form the starting-point for a line of railway into China.



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## OUR LITHOGRAPHIC ILLUSTRATIONS

## MILNER FIELD, YORKSHIRE.

THIS house, which stands in a prominent and commanding position, overlooking the valley of the Aire, between Saltaire and Bingley, was commenced in 1869 as a residence for Mr. Titus Salt, of Saltaire. Two years were occupied in its erection, the interior being temporarily fitted up for occupation; the decoration is now being carried out gradually in high-class art. The style adopted is Twelfth Century Mediaeval, which has been strictly adhered to, as far as consistent with modern requirements. The general contractors were Messrs. Shaftoe and Barry, of York. The ornamental metal-work was executed by Messrs. Richardson, Slade and Co., of Browlow-street, London; the furniture and dadoes by Messrs. Marsh, Jones and Cribb, of Leeds; the stained glass by Messrs. Saunders and Co., of Endell-street, London; the cartoons being drawn by Mr. Weekes, who also painted the chimney-piece and dado panels. The carving and wall decorations have yet to be done. The architect is Mr. Thomas Harris, of Gray's-inn Chambers, High Holborn, London. Our illustrations of this house consist of three sheets, which includes north, south, and end elevations, and plans.

## DOORWAYS.

We publish this week a few details of doorways, by Mr. W. H. Lockwood, of the Adelphi, in brick and stone, which, though simple in design, came out satisfactorily in execution, and are not of an expensive character.

## DESIGN FOR TOWN-HALL, NOTTINGHAM.

This is a design for a Town-hall, to suit the site on the east side of the great Market-place, Nottingham, by Lawrence G. Summers, a student of the Nottingham School of Art. The design gained the silver medal in the National Competition, this year, at South Kensington. The building is supposed to be faced with a light coloured stone, with red Mansfield stone bands. The roof to be covered with thick green slates, and surmounted by a bold iron ridge. The sculpture represents various historical events in connection with the town. The large tower is to contain the clock and carillon machinery. The small tower to serve as a ventilating and smoke shaft from the workshops and heating apparatus beneath. There would be a tower on the north side, not shown on these elevations, which would contain an observatory, for the use of the borough engineer.

## SPECIMENS OF FRENCH, GERMAN, SPANISH, AND ENGLISH RENAISSANCE.

The nine illustrative examples of Renaissance architecture shown in our double sheet are described by Dr. Zerffi on p. 747.

## THE CHURCH OF THE ANNUNCIATION, PRICK-END, NEAR CHISLEHURST.

This church, of which we give an interior view, has been erected from the designs of Mr. James Brooks, 11, Serle-street, Lincoln's-inn. The materials used for the walling are Kentish rag inside and outside, with Douling stone dressings, the columns, arches, &c., being of the latter stone; the shafts to sedilia canopies are of marble. The place, as at present carried out, consists of nave, aisles, chancel, part of the morning chapel, sacristies, &c. A tower on the south side of chancel, and the eastern portion of morning chapel, remain for future carrying out. The accommodation provided is for 671 persons,

and the cost has been about £6,000. The builder was the late Mr. W. Henshaw.

## OAK CABINET.

The cabinet of which we give an illustration is designed by Mr. Maurice B. Adams, to be executed in oak, rendered a dark colour by the fumigation process. It is intended to occupy a space at the end of a small dining-room opposite the fireplace. The upper part is for cabinet purposes and the display of china specimens, but the lower half is arranged as a sideboard. The panels in the lower doors are perforated for ventilation, as shown. The drawer fronts, return ends of lower part, door panels, cove, and sides of upper half are carved in flat ornament. The carving in the cove is slightly picked out in subdued colours. The panels in the back part at either side of the cabinet are of silvered glass. The fittings are of brass.

## SKETCHES ON THE LOIRE.

We are enabled to give four illustrations from Mr. Ernest George's new book "Etchings on the Loire and in the South of France," just published by Mr. Murray. Our review of the book will be found on p. 746.

## DESIGNS FOR ENCAUSTIC TILES FOR MESSRS. R. MINTON TAYLOR AND CO. BY JOHN P. SEDDON, ARCHITECT.

We give another illustration this week from the series of designs for encaustic tiles which Mr. Seddon has made for the firm of Messrs. R. Minton Taylor, and Co. This consists of single tiles and groups of tiles, which form part of designs for general arrangement, which will be given hereafter. They admit of considerable variety of colouring, or may be executed in the ancient manner in two colours only, the ornament being in white clay, inlaid in red clay, and the whole afterwards covered with a transparent glaze, which is usually yellow, changing the white into yellow, and giving a richness to the red and harmonising both; or a green glaze may be used instead, with good effect. The labels can, at small expense, have other words and letters introduced than those of "Gloria in Excelsis," for which they were specially designed, and so would be found useful for various inscriptions.

## FRENCH PIER CAPITALS.

In this week's BUILDING NEWS we give a very copious report of the lecture delivered before the Architectural Association, on Friday evening last by Mr. Edmund Sharpe, descriptive of the Association's excursion to France in August last. The lecture was exceptionally well illustrated by a large number of diagrams, which had been enlarged by the excursionists from the sketches they made at the buildings visited. Mr. Sharpe also exhibited a number of sketches relating either to the buildings visited, or to those with which they could be usefully compared. By the courtesy of Mr. Sharpe, we are enabled to reproduce seven of his own sketches of detail, viz.:—  
1. Le Mans Cathedral: nave pier, north-west side. 2. Le Mans Cathedral: another nave pier, same side. 3. Sens Cathedral: aisle arcade. 4. Sens: choir, north side. 5. Noyon Cathedral: choir, south side. 6. Sens: nave. 7. Sens Cathedral: twin pier, choir, north side.

## PROPOSED MONUMENT TO BISHOP WILBERFORCE.

We give an illustration of a monument to the late Bishop Wilberforce, about to be erected in Winchester Cathedral, from the design of Sir Gilbert Scott, R.A. The steps and bases are of

marble; the shafts supporting the canopy will be covered with mosaic. The canopy is to be of alabaster, enriched with mosaic subjects in medallions. The tomb and effigy of the deceased prelate will be executed in alabaster, and mosaic subjects will be inserted in the panels of the tomb.

## CHURCH NEAR DROMORE CASTLE.

This sheet forms one of the series of sketches contributed by E. W. Godwin, F.S.A.

## THE SOCIETY OF ARTS STOVE COMPETITION.

THE rumour, afloat for some time, that the Society of Arts would decline to award any prize in the competition arranged on the proposition made by the late Sir William Bodkin, so long ago as July 19th, 1872, turns out to be correct: A gentleman, who did not wish to have his name disclosed, volunteered to give the sum of £500 with a view to encourage the development of improved means for the economic use of fuel in private dwellings. The Society of Arts accepted the offer, a committee was formed, and public notice given of the conditions under which the competition would take place. There were 204 articles sent in for competition, and after consideration, 107 were retained for the purpose of being tested. The duty of personally conducting the experimental testing, under the superintendence of the committee, was placed in the hands of Mr. Davies, a gentleman who had been a student, exhibitor, and prizeman at the Royal School of Mines. The operation of testing extended over many months, and the results had then to be arranged in a convenient form to enable the committee to institute a proper comparison, and to arrive at a judgment. This has necessarily occupied considerable additional time, and has unavoidably delayed the final decision. Whilst the council recognise the labour and expense which the various competitors have incurred in bringing the contrivances under trial, they consider it their duty to point out that the Society has been involved in very considerable outlay in providing special rooms and appliances for the purpose of these trials, and in the actual carrying out of the tests. A careful consideration of the returns and facts, the council say, has forced upon them the conclusion, which they have arrived at with very considerable regret, that while giving full credit to the invention and efforts of the competitors, for the care and labour which they have bestowed upon their contrivances, the council nevertheless are unable to award any prize.

## CHIPS.

On Monday the first mission church in connection with the Wilberforce Memorial Fund, which is situate in the parish of St. George's, Camberwell, was opened by the Bishop of Guildford. The church will seat 250 persons.

A new U. P. church is about to be built at Leith.

It is proposed to carry out some extensive restoration at Paul's Meeting Independent Chapel, Taunton, built in 1797. The Repairs Committee have obtained plans from Mr. Foster, architect, of Bristol, and the estimated cost is £1,100.

New District Schools have been opened at Moughtre, Salop, from plans prepared by Mr. Sturkey, of New Town, architect, by Mr. Stephens, of Penstrowed, builder.

The new Darlington Fever-hospital was opened on Thursday week. The building has been erected at a cost of £9,000 from the designs of Mr. G. G. Hoskins, of Darlington.

Mr. Boehm has received a commission to execute the bronze statue of the late Field-Marshal Sir John Burgoyne, which is to be erected by subscription, and placed in front of the War Office.

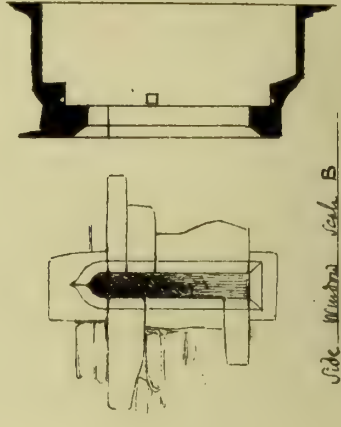
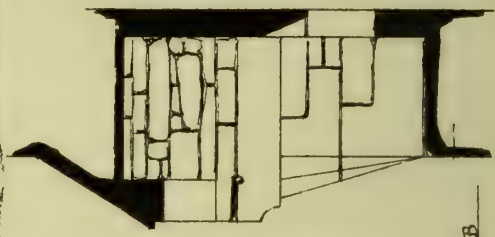
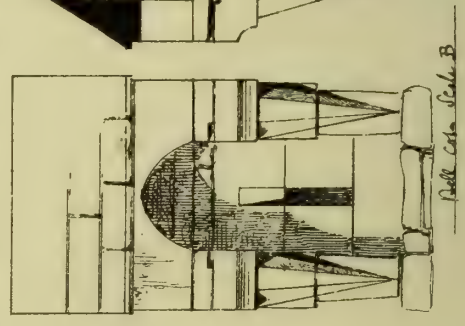
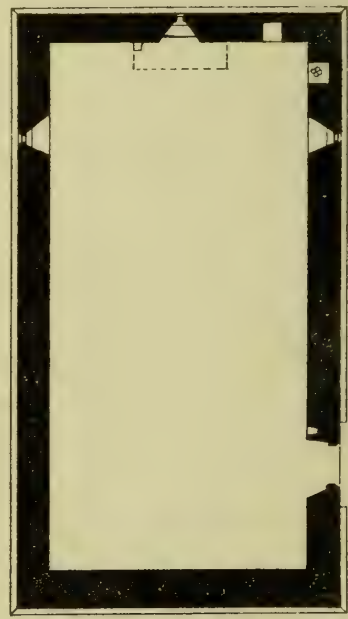
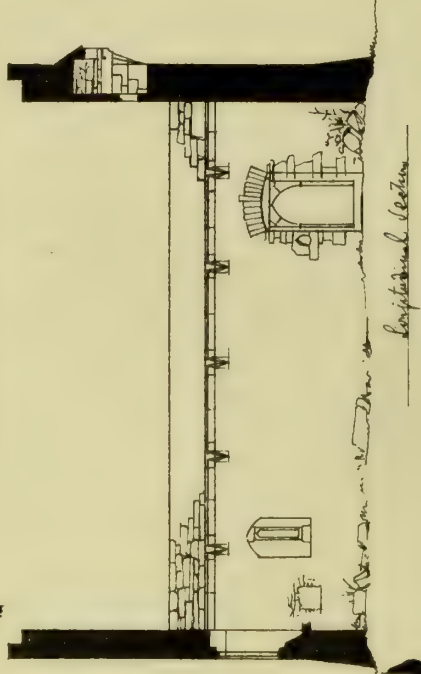
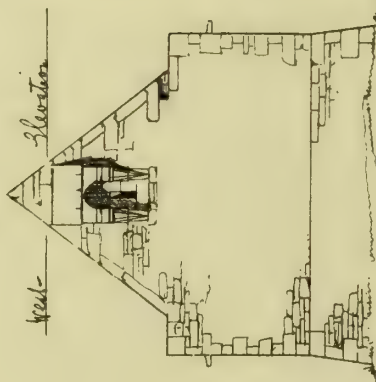
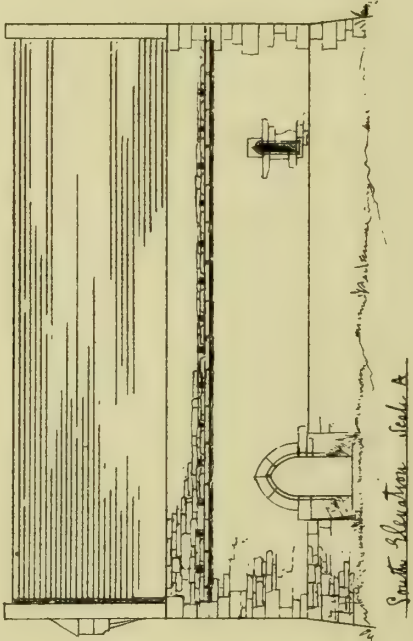
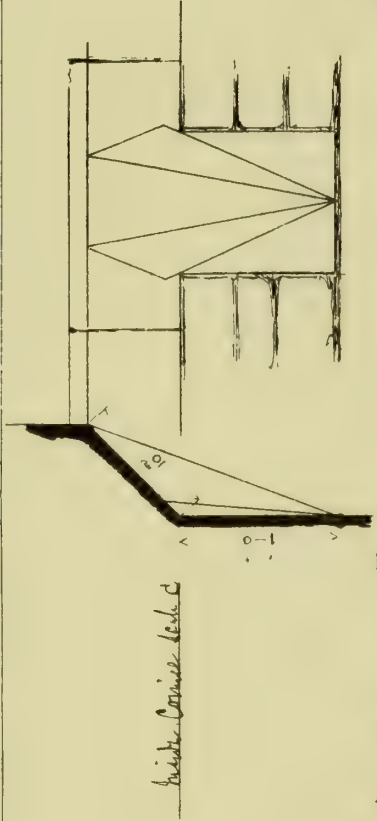
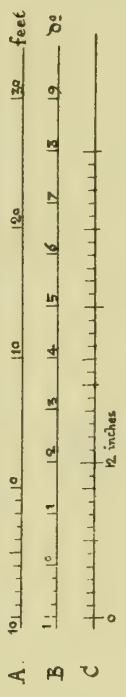
Mr. Ellis Eyton, M.P., is about to bear the cost of the erection of a block of buildings on Rhyl pier. The buildings will consist of concert hall, dancing saloon, and recreation-rooms; and if the present designs are adhered to the cost will be over £5,000.







Church near Dromore Castle Co. Limerick

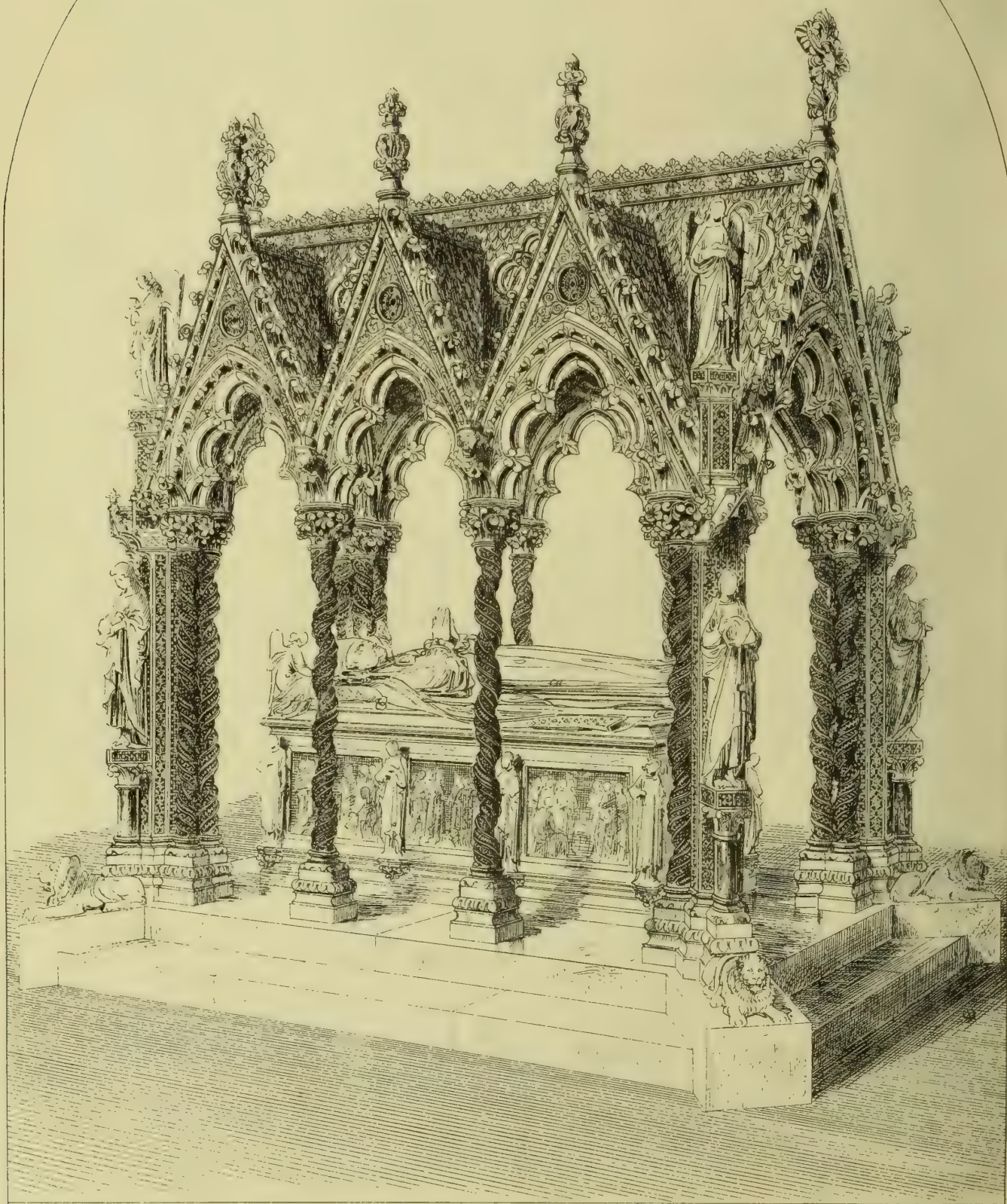


Measured & Drawn by S. W. G.









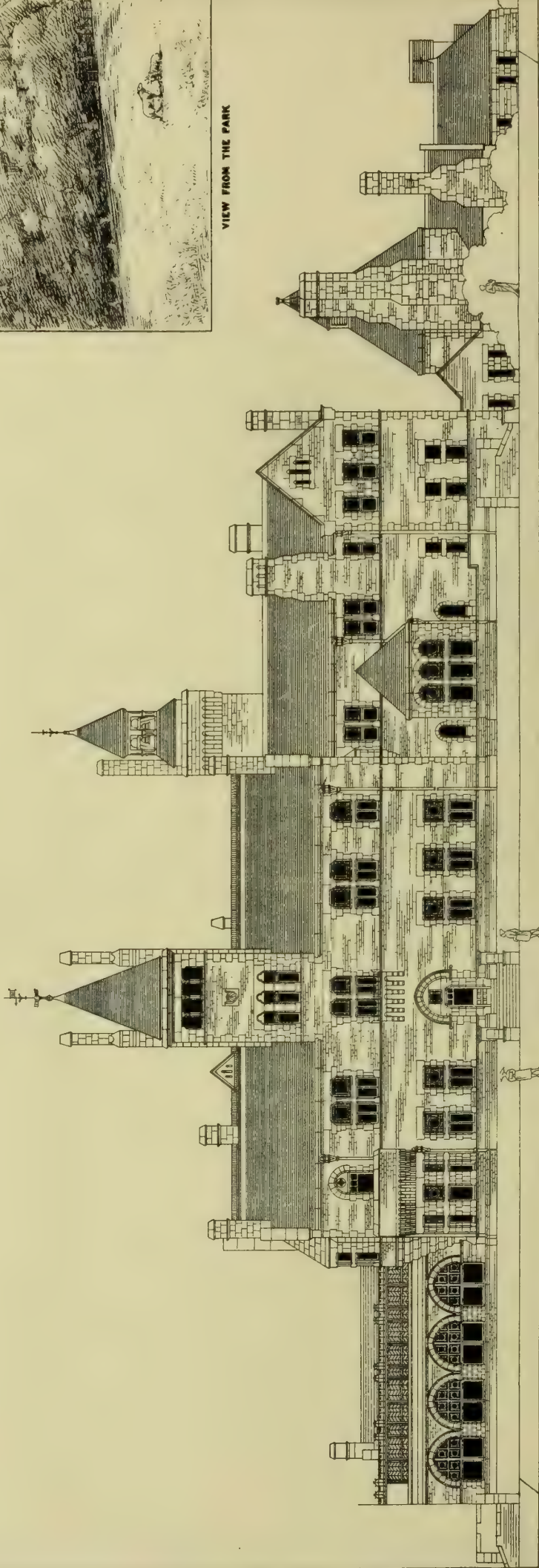
PROPOSED MONUMENT TO BISHOP WILBERFORCE:  
WINCHESTER CATHEDRAL & SIR G. G. SCOTT R.A. ARCHITECT





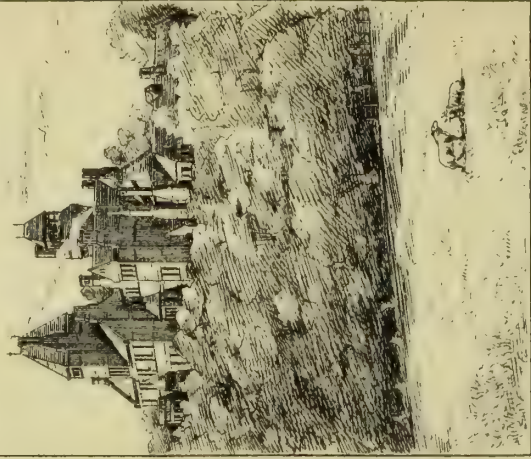


MILNER · FIELD · YORKSHIRE ·  
THE RESIDENCE OF TITUS SALT ESQ<sup>RE</sup>



SOUTH FRONT

SCALE OF FEET.



VIEW FROM THE PARK

THOMAS HARRIS  
ARCHITECT.

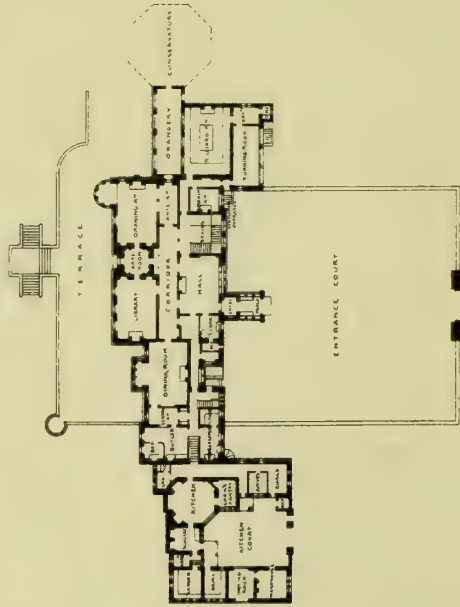




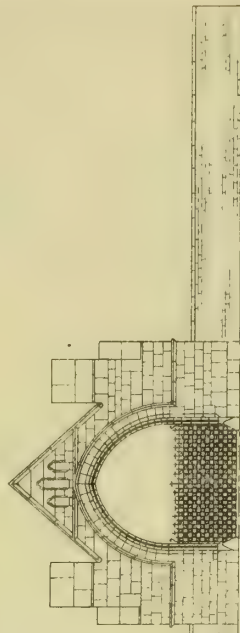


MILNER · FIELD · YORKSHIRE ·

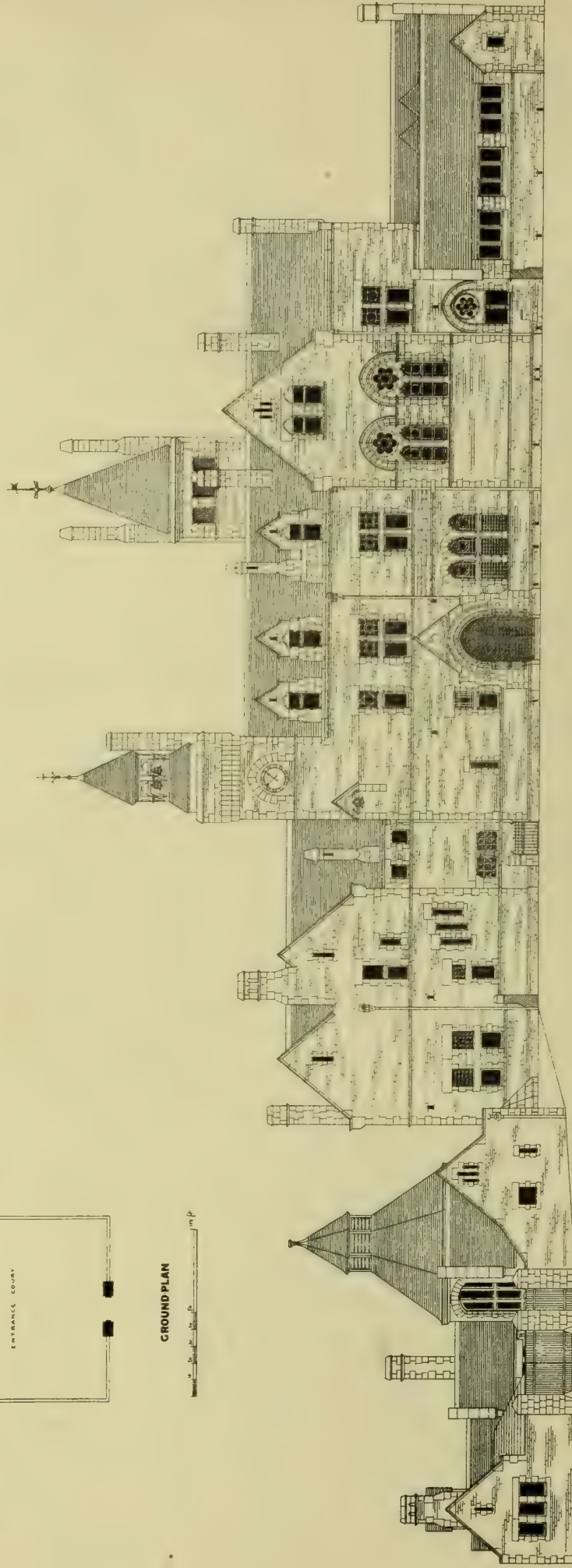
THE RESIDENCE OF TITUS SALT ESQ<sup>RE</sup>



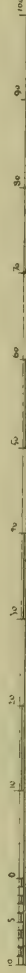
GROUND PLAN



GATEWAY TO ENTRANCE COURT



NORTH FRONT



SCALE OF FEET

THOMAS HARRIS  
ARCHITECT



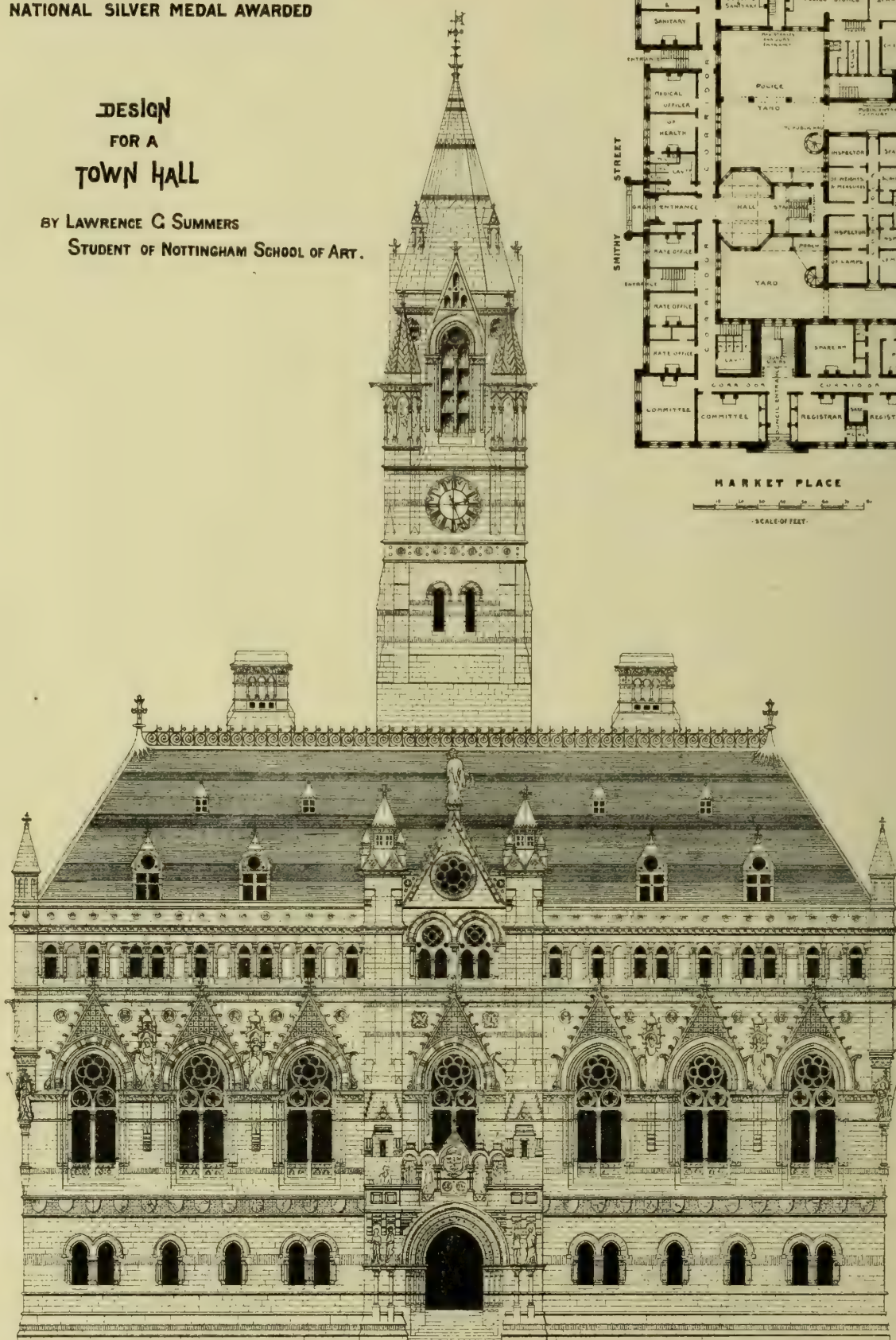




**NATIONAL SILVER MEDAL AWARDED**

# DESIGN FOR A TOWN HALL

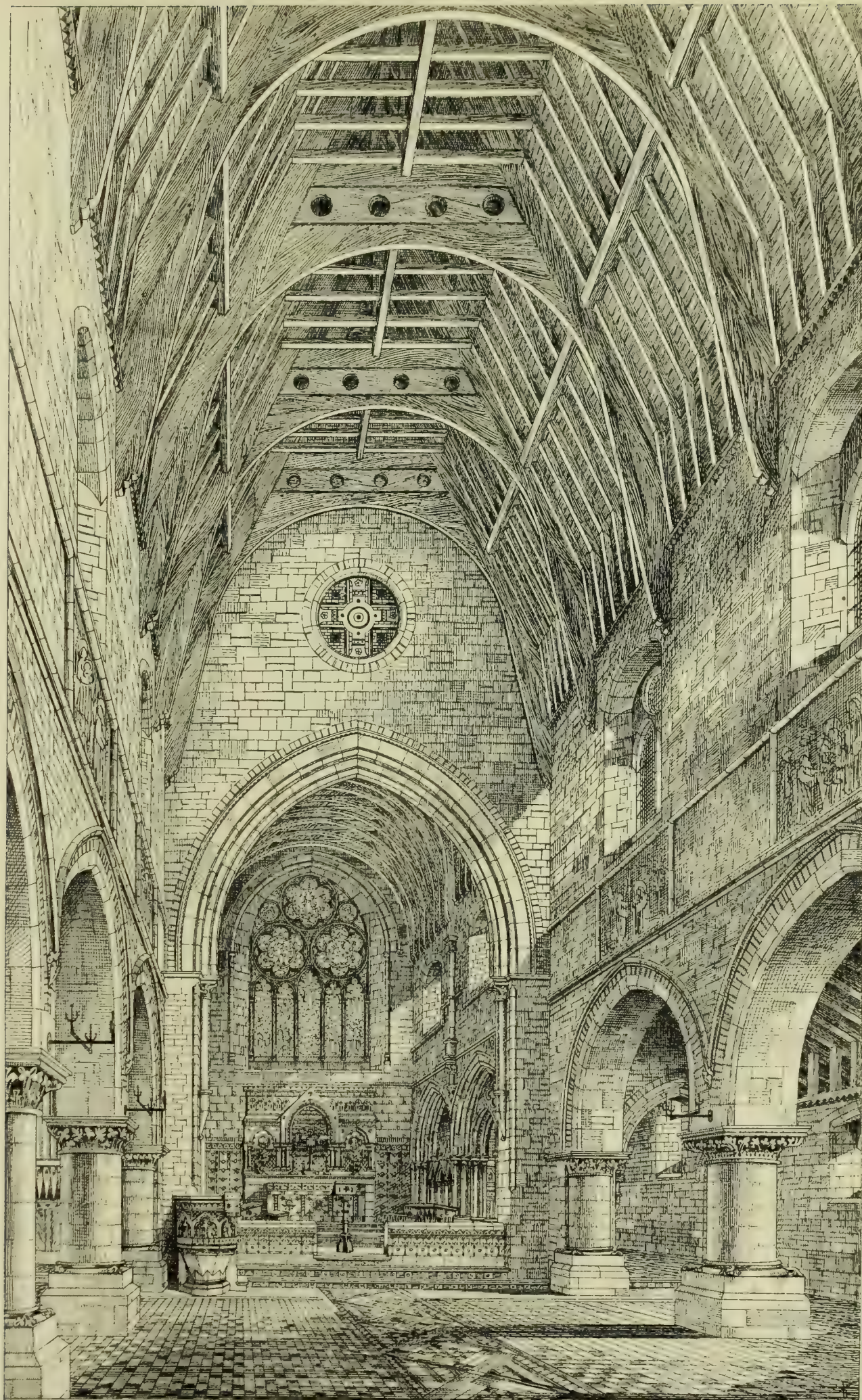
BY LAWRENCE G SUMMERS  
STUDENT OF NOTTINGHAM SCHOOL OF ART.



ELEVATION TOWARDS MARKET PLACE.

0 5 10 20 30 40 Feet





*Church of the Annunciation, Chislehurst. Jas. Brock's Arch'n. S. & W. C.*

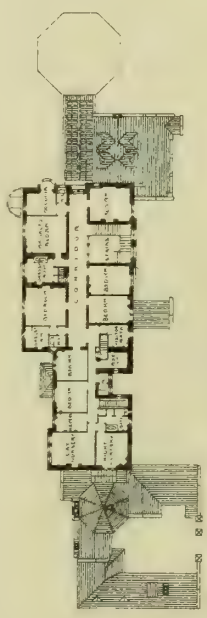






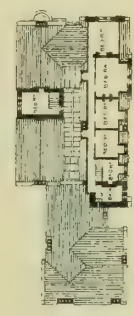
MILNER · FIELD · YORKSHIRE ·

THE RESIDENCE OF TITUS SALT ESQ<sup>RE</sup>

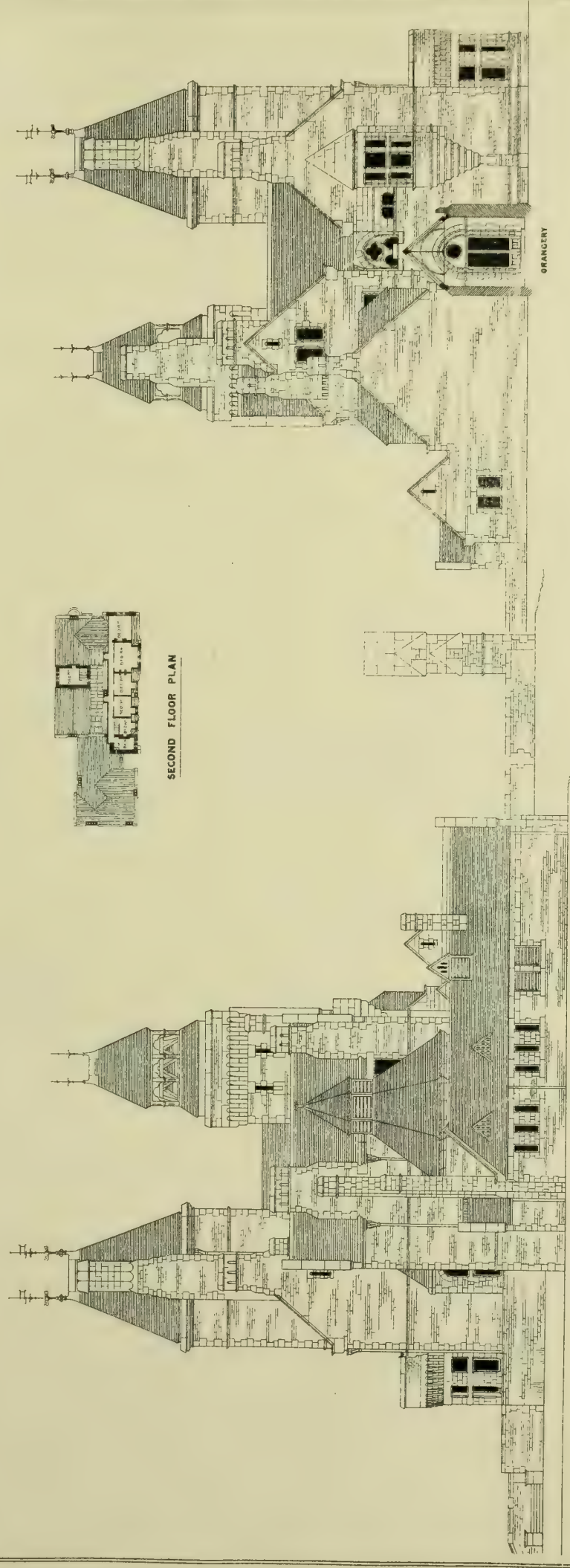


FIRST FLOOR PLAN

SCALE OF FEET TO PLANS



SECOND FLOOR PLAN



EAST ELEVATION

WEST ELEVATION

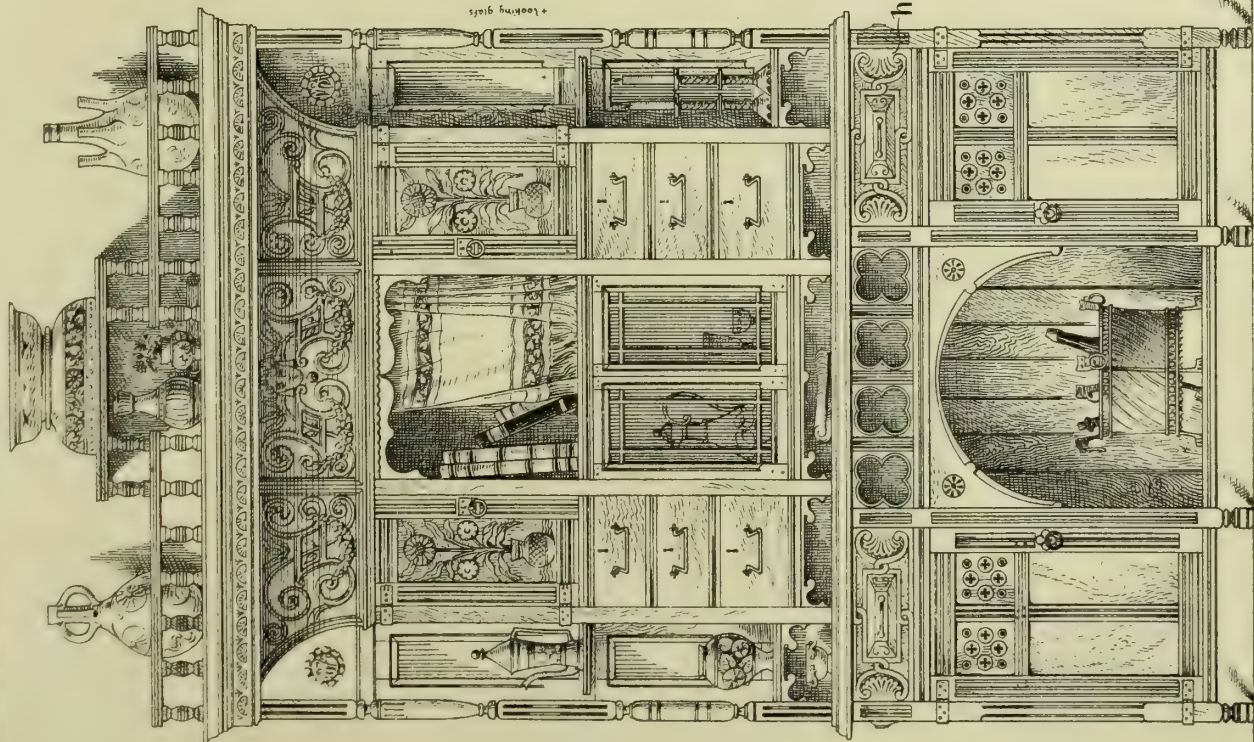
SCALE OF FEET.

THOMAS HARRIS, ARCHITECT





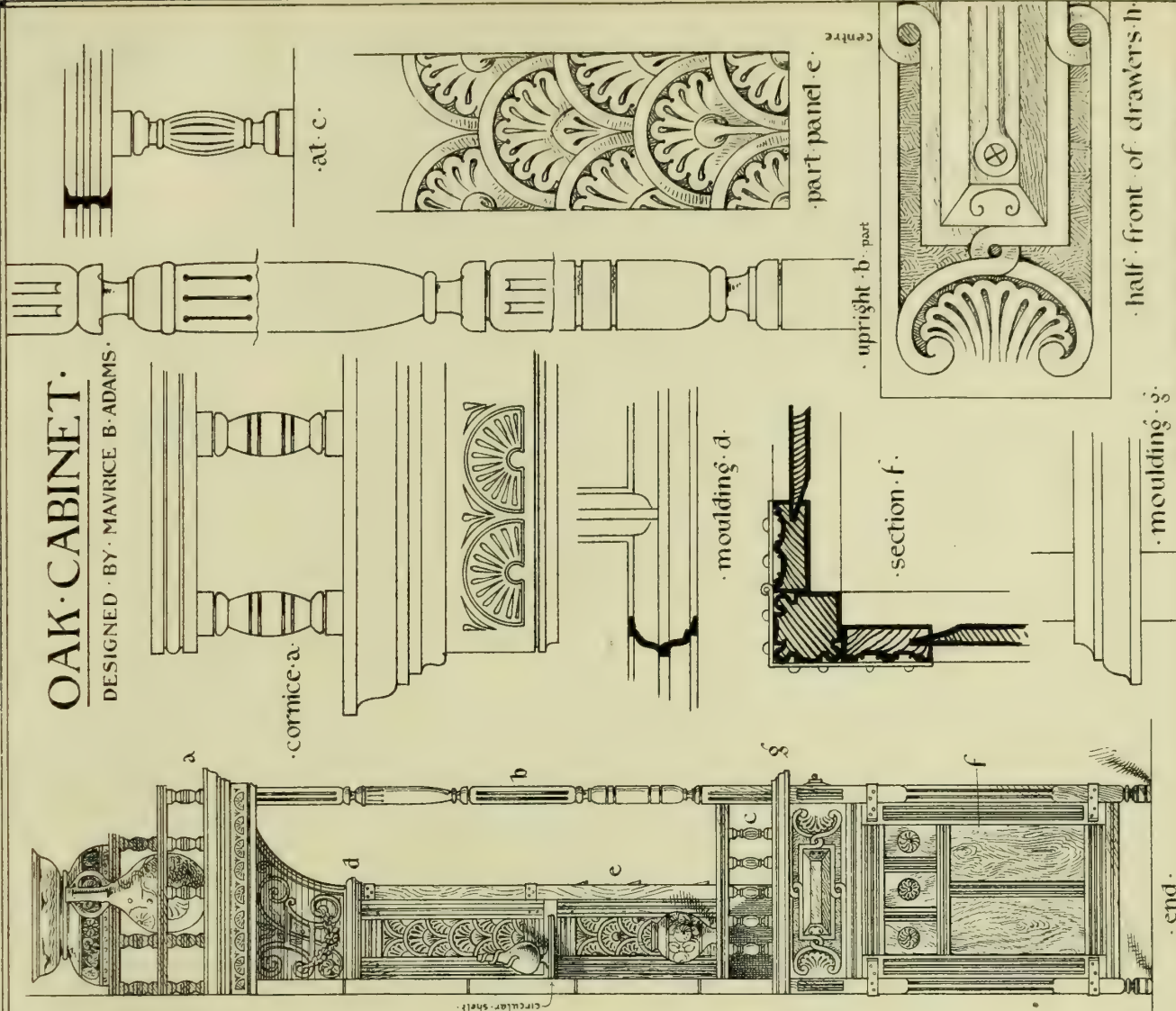




SCALE OF FEET  
SCALE TO DETAILS

# OAK-CABINET.

DESIGNED BY MAURICE B. ADAMS.





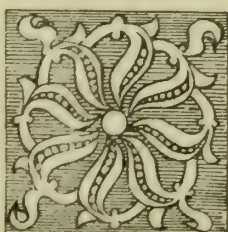
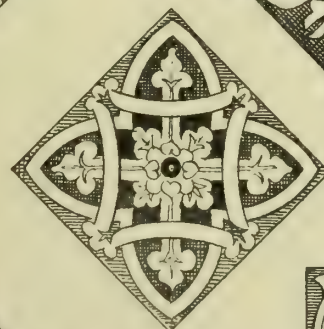
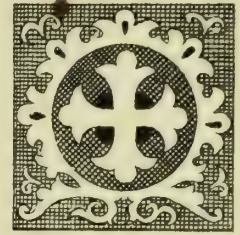




DESIGN FOR ENCAUSTIC TILES FOR R. MINTON TAYLOR & CO.

BY

J. P. SEDDON, ARCHT.



SCALE OF 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 INCHES

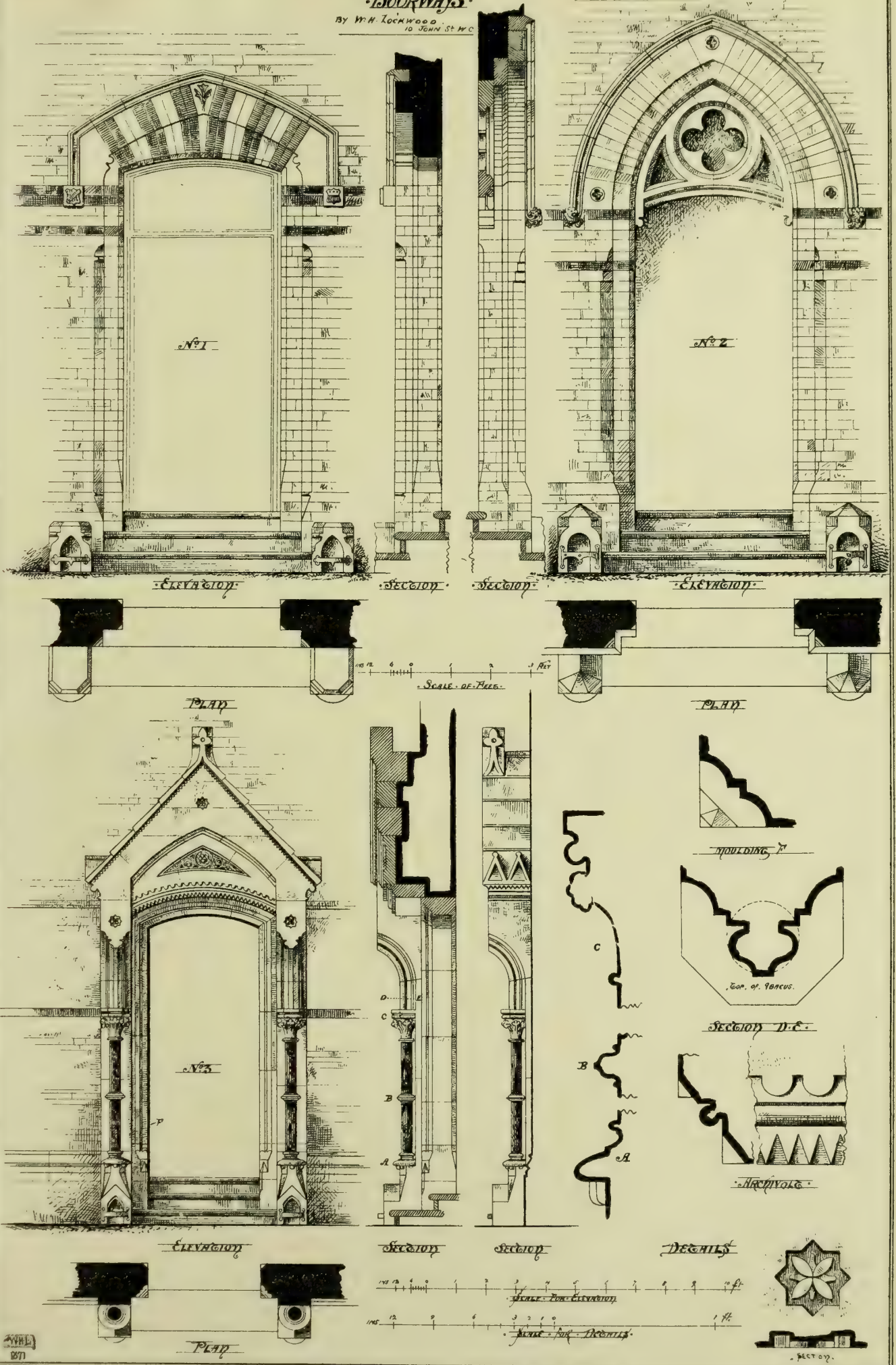






DOORWAYS.

By W. H. Lockwood.  
10 JOHN ST. N.Y.C.









## THE VIENNA EXHIBITION.

FOUR volumes of Reports have been issued from the Stationery Office by the British Royal Commissioners to the Imperial Exhibition at Vienna. This great international competition took place only last year, and seeing that serious labours were imposed upon those who undertook to be its historians, from an English point of view, no time has been lost. So many and so various were the tasks assigned them, indeed, that we may hoped to see the several papers reproduced as separate publications, in order that they may reach the different classes interested. As a commencement, however, copies should be presented to every artistic, scientific, and industrial institution; for, notwithstanding that there are still many who disparage the value of these cosmopolitan emulations, if it were possible to draw a comparative map of the progress indicated by them, the lines of advance by each nation might be not less distinctly traced and shaded than as if they were geographical indications. For our purpose there are seven sub-reports of peculiar interest—those on Machine Tools, Stationary and Moveable Engines, Technical subjects, Architecture, Building, and Pottery. In considering the results, we are bound, as a matter of fact and of justice to exhibitors from Great Britain, to remember the disadvantages under which they suffered in their efforts to make British art and handicraft appreciated in the parts of Europe where they are least known. The Parliamentary grant was an illustration of parsimony amounting to niggardliness. England, in the matter of her Parliamentary grant in aid, stood exactly on a level with the insignificant State of Roumania. She expended little, and purchased nothing. Had not private munificence come to the rescue, her position must have been nothing short of ignominious. Then, she had the Channel passage and the distance against her, the former always a hindrance to her art-displays on the Continent. Other hostile influences might be noticed; but it is unnecessary to overload the category of excuse, especially when, after all, we come out of the trial so triumphantly. Our representatives carry off twenty-six diplomas of merit, and four hundred and twenty medals, not to speak of Honourable Mentions, or the prizes taken by Indian and Colonial exhibitors, and not a murmur has been raised in the camps of Continental rivalry questioning the equity of these awards. On the contrary, our productions have been unreservedly praised by many even, of those the merits of whose productions have been avowedly eclipsed, and on some times the testimony of the technical Continental press is particularly gratifying, since it confesses our art-industry to have accomplished that which, a quarter of a century ago, was little more than an ambition in the bud. No craftsman in the world, remarks one of the Vienna journals, is superior in resources of mind to the English craftsman of the higher class, and the practical proof is seen in the demand for our ceramic wares in the markets of Austria. English goldsmiths' and jewellers' work, again, has stood the test of contrast with the model manufactures of Europe; but in iron, from the lightest and most ornamental to the most ponderous and powerful, no eulogies have been deemed too high for British machinery of every kind. The Viennese, in particular, admire our agricultural implements and our textile fabrics, and declare that they bore away the palm against fifty thousand competitors. This, without attaching to it too much importance—for an exhibition is an encouragement, not a coronation—is palpable evidence of development; but in order to precisely estimate its meaning, we must look, for example, at what were the American claims only seven years ago at Paris. They asserted an absolute supremacy in the construction of machines for the cultivation of the soil, and, although this was not allowed by the jurors, still, in the way of invention, their chance of

outstripping us was undeniable; whereas now their forest and prairie ploughs, and steam-axes, appear to have attracted most attention. Paris, at the same time, insisted that she had no rival in gold, silver, and bronze work; but emphatic testimony is borne by the jurors of 1873 to English progress in all three classes, whether of the costlier or the cheaper kinds, notwithstanding that neither the French, nor Austrian, nor the Italian manufactures betray any signs of a falling off in excellence. This is as it should be; the object being, not to see other industries decaying, but to raise our own to their standard, and, if practicable, to surmount it. The days were, when with the usual exaggeration of jealousy, it was denied abroad that an elegant carriage was ever built in Oxford-street or Long-acre, the latest result being, we believe, that not a single carriage of English make was left unsold at the Vienna Exhibition. With respect to pottery, those who recollect, apart from the names of Wedgwood and Minton, the monotony and rudeness of English productions a generation ago, will (while grateful for the appreciation bestowed on it last year, under many disadvantages, in an emulation in which the foreign element necessarily prevailed) not consider the distinction undeserved. Statuary, majolica ware, table objects, vases, wine-coolers articles of grace, imitated and of new design, and all the varieties of which this exquisite art is capable, were shown, which in point of colour, no less than of form, could scarcely be surpassed; and this, perhaps, is a department in which the national improvement, relatively speaking, has flourished more brilliantly than in any other since the grand industrial wager, so to call it, of 1851. It is not too much to say, indeed, that we have witnessed a reformation in our ceramic manufactures. Turning to another class, in which English excellence has been acknowledged pre-eminent—that of textile fabrics—it must not be forgotten that these are of two descriptions—the one designed for the luxury, the other for the necessity, of the consumers. Italy will probably keep ahead, more or less, with her velvets, and France with her silks; and the latter and Belgium with their laces; but in the courts assigned to cloths, cottons, and woollens, there could hardly be said to exist a serious competition. In a special Austrian report, not included in the official volumes before us, may be found the curious remark that it would be well for all the armies of Europe were they clothed from English looms. At the same time, it was well that artisans from various countries in the west of Europe should, for the first time, have had an opportunity of comparing notes with those from the regions which form its eastern fringe. The one has much to learn from the other, and such comparisons, intelligently and dispassionately drawn, are of infinite value, as suggestive of new ideas, as quickening industrial sympathies, and as widening the scope of the workman's and artist's view. It being impossible, within our limits, to compress, upon even the smallest scale, so much as the generalities of these ample reports, some desultoriness is unavoidable in dealing with their contents. Even narrowing the review to that which, perhaps, will be the most interesting section—the appendix, containing the Austrian official reports relating to objects contributed by British exhibitors, there is, amid some vagueness, so large a mass of practical statement, that the aggregate is difficult to handle. Generally, the criticisms are favourable, though candid, and the candid paragraph ought to be no less welcome than the laudatory, especially as the praise is often lavished where, from such jealous judges of their renown for taste, it might have been least looked for. Of course, however, the products of Manchester and Birmingham, of our foundries and mills, are those which always command an unlimited panegyric; while, equally, of course, it was not to be expected that a set of German arbitrators, with their fastidious exclusiveness, would have much to say concerning our skill

in the manufacture of musical instruments. They, not unnaturally, suggest the importance of knowing, through an industrial census, if practicable, what proportion of foreign artisans are employed in certain crafts, the illustrations of which come from Great Britain, though the actual workmanship may, in a large degree, be foreign. The opposite holds good, it is true, as between nominally Continental and really English work done abroad; on railways, on rivers, on harbours and breakwaters, and marshy lands abroad; but a relative view of the subject, liberally regarded, would possess a high practical value, as a commentary on the apparent results of international exhibitions. Without them, however, all such displays bring into strong relief the influences, for instance, of emigrant industry—as it may be termed—though this is only where large refugee colonies have been established. Thus at Vienna were to be distinguished plainly the trophies of workmen, strangers a few years ago, attracted to the Austrian capital by its repute for riches, from the lower borders of the Danube, and from Italy. The Germans, as politically represented at Berlin, made no great show, except in the military department and that of heavy machines; but this has been their customary characteristic. It was their pride, at Paris, to be on the ground with the biggest cannon, the largest shot, and the most massive models of fortification in iron. They evince far less interest, as they exemplified themselves at Vienna, in civil engineering, drainage apparatus, artificial stone compositions, architectural materials and designs, than, leaving the English out of sight for the present, the French or the Belgians, although, from Molsheim and from Zornhoff come several specimens of ingenuity in the construction of machinery dedicated to purposes altogether peaceful. But, in the buildings erected in the "Park," which, as at Paris, encircled the "Palace," and to which special papers are devoted in the reports—as being models or experiments in themselves—there were striking, if not numerous, illustrations, similar in aim, and superior, it would seem, in applicability, from the smaller territories of Germany and the North. One splendid piece of work, destined to turn out all the details of machinery-making, from a rivet to a locomotive complete, came from Graffenstaden, and might have excited the admiration of Stephenson himself. There was something similar, though smaller, from Mulhouse, which obtained unreserved praise. But, at present, although the Report gives the lists of jurors and exhibitors, with the tables of awards, the names of the fortunate recipients are omitted, which is no slight defect in a work professing to be a full and authoritative record. Nevertheless, that error will doubtless be rectified, as the Exhibition itself was, after its long probation in chaos, until, from being the boldest in conception of any, it grew to be the largest in size, containing the greatest multiplicity of objects, until almost fulfilling the desire of the Austrian Archduke Kaiser, that it should "represent the state of culture of the present time, and the entire sphere of national economy"—a wide programme, yet one which fell not far short of accomplishment, even by England, in spite of her economy; by France, notwithstanding the bitter burdens of the war; and by Germany, in spite of a little jealousy. With reference to Great Britain, some facts of unmistakable significance have already been pointed out; but the most impressive and emphatic of all remains. The Royal Commissioners assure us that the Customs duties paid on the English goods exhibited at Vienna, and sold at the close of the Exhibition, for the Austro-German Empire, exceeded those paid by any other country; and they add—a most important circumstance to be remarked—"there is no question that the Exhibition has had the effect of making the specialities of British manufacture more widely known in Austrian, and even in Eastern markets, and it appears



beyond doubt that its direct results upon the industry of the British Empire have been such as fully to justify the expenditure incurred by this country, which, in the total, was less than £30,000, while on the Paris Exhibition of 1867, which gave rise to endless complaints and disappointments, it exceeded £120,000. Besides the classes we have spoken of, several others reflected, by the reception given them, signal credit upon English inventions, artistic taste, and individual perseverance, as will be found if a careful study be bestowed upon details rather difficult, perhaps, to bring into groups, far and wide as they have to be sought in these dense thousands of pages:—printing presses, the paper-manufacturer, book-binding, stone and wood-polishes, frame-making, electrotype, diving machines, carpenters' tools, water-mills, waggon-building, faience, gem, and crystal cutting, glass-blowing and engraving, and so on through a miscellaneous catalogue that might be extended in each direction to an indefinite length. But enough, perhaps, has been deduced for the present, from this latest publication by Her Majesty's Stationery Office, to demonstrate that our artists and artisans, our manufacturers and inventors, went on no idle errand in accepting the challenge thrown down at Vienna; for never have they been more successful, both as relates to the moral influence established, or the practical fruits which have been reaped.

#### ON THE ORNAMENTATION OF THE ROMANESQUE, TRANSITIONAL, AND LANCET PERIODS IN THE NORTH OF FRANCE.\*

By EDMUND SHARPE, M.A., F.R.I.B.A.

##### INTRODUCTORY.

AT half-past eight o'clock on the morning of Monday, the 17th of August last, a party of upwards of sixty gentlemen, of whom the majority were members of this Association, left a central rendezvous in the City of Paris to set out, under my guidance, on a pilgrimage to the cathedrals and churches of the North of France. The experiment was looked upon by many as a somewhat venturesome one, and it was not without certain misgivings that I undertook the pilotage of so large a party of heretical foreigners through a country in which, looking at the present state of public feeling in France, any slight act or speech of inadvertent license might arouse the susceptibilities either of the natives or of the clergy, or of the police, and create for us difficulties which might bring our excursion to a speedy close. It was on this account that, as a preliminary measure of necessary prudence, I applied to the French Minister of the Interior, to whom I explained the nature of our intentions and the objects of our journey, requesting his formal authorisation of the passage of the party through the Departments indicated. He not only very graciously accorded this authority, but he gave instructions to the Prefects, Sub-prefects, the Police, and the Government Architects, to hold themselves at our disposal during the period of our stay in the several towns we proposed to visit, and to afford us all possible facilities. I also wrote to the three archbishops, the three bishops, and the provincial clergy of the churches contained in our programme, for their permission to visit these churches, and to hold meetings and deliver discourses in them at convenient hours. To all these applications I received, in every case, favourable answers, many of which are remarkable for the goodwill and courtesy they display. We had, however, not only to guard against the possibility of mishap, but also to provide for the actual human necessities of the party in respect to board and lodging during our sojourn in Paris and our peregrinations through the provinces, and also of our transport from church to church where the railways were not available. This I managed to arrange for with M. Barrat, the proprietor of the Hotel Buckingham at Paris, who contracted, for a given sum per

head, to provide board and lodging for the whole party in the different towns at which we stopped, and to convey us to the places indicated in our programme during the three days that we travelled by carriage; and though in some of the smaller towns some of the junior members had, I believe, to "rough it" a little, yet I think I may say that this difficult part of the arrangement was managed to the entire satisfaction of the whole party. I am afraid M. Barrat had no great advantage out of his contract, but that did not affect the manner in which he fulfilled it, and I hope that this fact will not be forgotten by any members of the Architectural Association when they visit Paris at any future time on their own account. Upon the whole, then, I think I may safely declare that whatever may have been the slight difficulties and drawbacks that were encountered, the entire excursion was thoroughly enjoyed by the whole party. To this success two things contributed in a very material manner—first, the unfailing good humour and *esprit de corps* of every member of the party, and secondly, the uniform courtesy that we met with at the hands of all with whom we were brought into contact, from the *archiprêtre* who escorted us round his Cathedral, down to the *gamins* who carried our knapsacks; and whatever may have been the lessons in architecture that we brought back from France, there is one that affects the every-day relations of social life which the characteristically national politeness of our neighbours on the other side of the Channel cannot fail to impress upon those who take part in occasional opportunities of Continental travel such as these excursions present. Now, gentlemen, my business here to-night may be shortly summed up under the two following heads: It is, first, to tell you what we saw, and secondly, what we learnt, during this French excursion. My lecture will, therefore, be divided into two portions. In the first part I shall follow our line of travel, and in a very brief and summary manner describe to you the chief characteristics of the churches that we visited, indicating the different periods of architecture to which their chief works respectively belong. I shall then endeavour, by the help of the diagrams with which the side walls are covered, to trace out to you the progress of the art of carving in stone during the three earliest periods of Mediæval architecture as presented to us in the works of the cathedrals and churches of the North of France during the eleventh, twelfth, and thirteenth centuries. And I will conclude by offering a few general considerations which these typical examples of French work suggest to us when we come to compare them with the contemporaneous works of our own country.

##### DEFINITION OF TERMS.

But in the first place we must come to an understanding as to the technical terms I may have to use in the course of these descriptions. I promise you that they shall be simple and few. It is of course of first necessity that when I use a word you should know what I mean by it. The choice of the term is a matter of secondary importance, but it is well that it should be, as far as possible, self-explanatory. First, then, in speaking of the three general stories into which the main wall of a church is usually divided vertically, I will call them, as I have been accustomed for some time past to call them, (I.) the ground story, (II.) the blind story, (III.) the clerestory. The first and the last of these terms explain themselves; the middle one is that story which either screens off or opens into the space that intervenes between the vaulting of the side aisle and the wooden roof above it, and which is usually unlighted and dark. But in many of these French churches there are four stories, the additional story being a gallery over the ground story, frequently almost as lofty as the ground story itself, and lighted by an upper range of windows in the raised aisle wall; where this exceptional feature occurs, I propose to retain for this lighted gallery the familiar term of triforium. Thus in the two cases we shall have, in Auvers Church—of which the present Mayor of Louth, our old friend Mr. Fowler, has been good enough to supply me with an elevation from his sketches made during the excursion—the ground story, the blind story, and the clerestory; and in Laon Cathedral a ground story, a triforium, a blind story, and a clerestory. The term arcade I confine to wall arcades, in the side aisles and elsewhere; and in referring to the longitudinal divisions of the main wall of a

building I shall, instead of using the word arcade or bay, which has a double signification, speak of them as compartments. And now a word as to

##### STYLES AND PERIODS.

We find in France no architecture corresponding with our earliest English work, the Saxon, in which we find, in the vertical stone ribs, the triangular arches, and the baluster shafts, &c. that we saw at Earl's Barton and Barnack the year before last, an apparent imitation in stone of the carpenter's work of which probably their earlier churches were constructed. But there is work in France which, although of an earlier type than our earliest Norman work, can be looked upon as nothing else than Romanesque. Under this general term, therefore, of Romanesque, I comprehend all the Mediæval work that exists in this district down to the first appearance of the pointed arch, which had certainly made its appearance in France pretty generally in arches of construction by the year 1130, and, in exceptional cases, still earlier. We next come to the great and grand Transitional period—the tomb, as I have ventured to call it elsewhere, of the Romanesque, and the cradle of the Gothic art. Of the prolific results of the inexhaustible fertility of invention and rapidity of production displayed by the builders of this remarkable period, we have no greater proofs than those which are preserved to us in the cathedrals and churches of the North of France. The character of these works has a strong family resemblance to typical works of the same period in other parts of Europe, and, together with a grace and beauty of its own, possesses, in common with the former, that fitness of parts, breadth of design, and boldness of construction, which characterise the works of this period all over Christendom. I am disposed, then, to put down the duration of the true Transitional period in the North of France at from 1130 to 1190. We now arrive at a point of time in the history of European art which is of the greatest possible interest to the architectural student. During the last ten years of the twelfth century, and the following first ten years of the thirteenth century, a style of building developed itself in England which produced remarkable results during the next thirty years of its existence in this country. This style of building is characterised chiefly by its elegant and luxuriant relieved foliage of a conventional type, by a multiplicity of minute and deeply-grooved mouldings, by its light clustered shafts, and by its tall narrow pointed windows. Some persons persist in calling this style of building Early English, although it has been placed beyond doubt that it was not the earliest characteristic English style; whilst others continue to call it First Pointed, although I have conclusively proved that it was not the first Pointed style practised in this country, and that the pointed arch was, in fact, used in a systematic manner in English buildings for nearly half a century before the year 1190. I have preferred to designate the period during which this style prevailed by a term derived from its most characteristic and uniformly-prevalent feature, namely, the tall, narrow lancet window I have already referred to, and to call it the Lancet period. By whatever term, however, we may choose to designate this period, no one, I think, will offer any objection to the limits that I have assigned to it, namely, from A.D. 1190 to 1245, or will hesitate to declare it, with me, to belong to that great phase of European art which we call by common consent Gothic, and to be, as I hold it is, the first completely-developed style of that phase of Mediæval art. For nowhere in Europe, with a single exception, do we find those two chief principles, lightness and elegance, which characterise Gothic work, so strongly pronounced, and so far advanced, as they were during the prevalence of this Lancet period in England. In Normandy, it is true, and that is the exception to which I refer, we find works which appear to rival in these two respects the works of our own country, but these works are exceptional; they are not typical works of the country in which they are found, and are, in all probability, the productions of men impressed with influences they had seen at work on the opposite side of the Channel. If this be true, it is remarkable that whereas in the eleventh century we received our architecture from Normandy, our builders should, within a century and a half, not only have completely emancipated themselves from the influences of foreign art, but have struck out a path for themselves. Well, then, with the exception of certain works in Normandy, I assert

\* As exemplified in the Cathedrals and Churches visited during the French Excursion of the Architectural Association in August, 1874. Lecture delivered before the Architectural Association at Willis's Rooms on Friday last, December 18.



that nowhere do we find at the close of the twelfth and during the early part of the thirteenth century any trace of the rapid progress in that direction which all European art subsequently took, as we do in England. So far as regards the district with which we are concerned to-night, I shall have such ample opportunity of proving the truth of what I have just asserted that I will not detain you further upon it now. I will only remark that the work of this period in the North of France differs so materially from that of the same date in England, and departs in all its leading features so little from the forms of the preceding Transitional period, that it appears difficult at first sight to give it a distinct classification, or to fix upon features which may enable us to characterise it. There is one feature, however, which it possesses in common with our own contemporaneous work which appears to be sufficient for this purpose; it is the plain lancet window, without tracery, which seems to have been employed throughout the whole of this short period. It is broader and shorter than our own, and it has been, in numerous cases, removed and replaced with larger traceried windows, which, indeed, has been the case with many of our own lancet windows. Until, then, some one supplies us with a better term, I will designate this period by the same term that I have adopted for our own contemporaneous period, and call it, for the present, at all events, the Lancet period of French art. But although the French did not arrive so soon as we did at the true principles of Gothic art, it is astonishing, when once apprehended by them, how rapidly they gained upon us, and how soon they passed us in the race. Whilst English architects were still travelling on a line of their own, and lingering amongst the delights of the so-called Early English or Lancet work of Salisbury Cathedral, Rievaulx Abbey, and Ely Presbytery, the last of which was designed so late as 1235, our Continental neighbours were engaged in developing a new style, which soon overran the whole of Christendom, which created prodigies of art in Europe, and in which Gothic architecture attained its climax. Many years before the Geometrical traceried windows of Westminster Abbey, Lincoln Minster, and Tintern Abbey had seen the light, the designs of Amiens Cathedral and St. Denis had been prepared, and I think I shall not be wrong in fixing the year 1230 as that of the commencement of the Geometrical period in France. I have no intention, however, of entering into that vast region of Continental art which opens to us when we advance beyond the middle of the thirteenth century, but will take the year I have just indicated as the limit of our inquiries to-night, as it is, with a few exceptions, that of the illustrations which are upon the walls.

#### THE CHURCHES OF PARIS.

Now, gentlemen, I began by telling you that it was at half-past eight o'clock precisely on Monday, the 17th of August, that we started on this excursion, and as we have not yet got to nine o'clock, I daresay there are many who are beginning to think that we have not much chance of getting to-night beyond the first day's work within the limits of the time which may be allowed to me. But I promise you that this very necessary digression shall be my last until we get to the end of the trip. The first day was devoted to the churches of Paris; and here I may state that the programme of the entire excursion stated in minute detail the work of each of the thirteen days that it lasted, indicating the very minute at which we should reach, and at which we should leave, every church on the list. It was issued to the members some days before we started, and I am proud to say that such was the discipline of the party, that it was carried into execution, as on all previous occasions, to the very letter, and that the final dinner was held at the very minute and place indicated in the programme. It happened to be graced with the presence of no less distinguished a guest than Mr. Fergusson, who would thus be a witness of the zeal and enthusiasm with which Gothic architects pursue their studies, whether they be competent or not to carry them into practical effect. Our visits in Paris were limited to the following five churches: St. Germain des Prés, the Chapel of the Hôtel Dieu, Notre Dame, La Sainte Chapelle, and the Church of Montmartre. The nave of St. Germain des Prés is Romanesque, and chiefly interesting for the capitals of its piers, which are what the French call *histories*—that is, they carry carved work of figures of men and beasts, which is of that barbarous and primitive kind that distinguished

not only the earliest Romanesque work, but is more or less characteristic of Mediæval sculpture until we arrive at an advanced point in the Transitional period. Whatever interest, however, this carved work might have derived from its early and quaint character is sadly disturbed by the manner in which it has been treated in modern times; for the church having been recently "decorated," the whole of these ignorantly-designed and clumsily-carved figures have been covered or "picked out"—as the modern decorator's phrase goes—with gilding, the rest of the capital being painted bright vermillion. I leave you to imagine the grotesqueness resulting from this kind of treatment, and the effect produced on the mind of the startled excursionist when he is told that these gilt gingerbread figures are the work of the eleventh century. The whole church has been similarly decorated, but in the Transitional choir it fails to diminish the interest that the student must take in the grand columnar piers of the apse, with their richly-carved capitals covered with the characteristic foliage of the period, about which we shall have to say so much by-and-by. The Chapel of the Hôtel Dieu (formerly, I believe, called St. Julien des Pauvres), is a little gem of the Transitional period, with its parallel triapsal east end and characteristic ornamentation. We have several illustrations of the latter on the walls, and measured drawings were made of the plan and elevations of the choir. It is a church that is difficult to find, and still more difficult to enter, for it is never opened except for the burial of paupers who die in the Hôtel Dieu, and even then the consent of the Director of the Hospital must be obtained. This was at once granted to us on application to that gentleman, who accompanied us himself on our first inspection of it, and allowed it to remain open to our party for the rest of the day. As to Notre Dame, it is impossible to do more in this hasty review than to notice one or two points of interest in its history. The first building of which we have anything left belonged to the latter part of the Transitional period, and was a grand design, which gives, in fact, its grandiose character to the entire structure as we see it at present, although its external appearance has been so entirely changed by the rearrangement of the whole of its windows, by the addition of flying buttresses with their pinnacles, and by the insertion of side-chapels between the buttresses, not only along the side aisles but round the choir and apse, as to give it, to those who first approach it, the appearance of a building of the thirteenth century. When, however, we enter the building and reach the crossing, we perceive at once, in the single compartment on each of its four sides which adjoins the crossing, the true key to the whole design, each of these compartments, north, south, east, and west of the crossing retaining their original blind story and clerestory, and having been left during all these alterations undisturbed, as being essential to the stability of the crossing and the lantern that surmounted it. I will only add that this grand building, commenced towards the close of the Transitional period, and the eastern part of which was consecrated A.D. 1081, exhibits in its ornamentation, particularly in that of its pier capitals, that gradual advance of taste as we proceed from east to west, which is apparent in almost all works of great magnitude, especially in France, and reveals to us the fact that Notre Dame, commenced in the Transitional period, and gradually carried on from east to west, was not brought up to its west end before the end of the first ten years of the twelfth century, and that its two western towers belonged exclusively to that period which I call the French Lancet period. In an able article that appeared lately in the *Times* newspaper, the restoration of the whole of Notre Dame has been attributed to M. Viollet-le-Duc. This is a mistake, that gentleman only having been intrusted with the completion of the work after the death of M. Lassus, by whom the greater part of these works of restoration were designed and carried into execution. La Sainte Chapelle, independently of the fact that its architecture lies beyond the limit that I have prescribed to myself this evening, is too well known, and has been too often described, to require any remarks from me. But I am disposed to suggest the consideration of the following questions to those who may happen to have seen it before it was restored, and since it received on its walls and in its windows the amount of beautiful coloured decoration that it at present carries: Has the value of the architectural

effect of the building by its treatment in this respect been diminished or not? Does the coloured surface of the whole work too exclusively attract and fix our chief attention? Are we able, as well now as formerly, to recognise and appreciate the true forms of the moulded and carved work of the building, and their natural effects of light and shade? The Church of Montmartre has not yet been either painted or restored, and we, therefore, saw it under the most favourable conditions for study, although partially in a state of ruin. It contains amongst its capitals some fragments apparently of Roman work, which had been taken from some building situated on the same site, which is the summit of the high ground that overlooks Paris from the north. The church belongs almost entirely to the Transitional period, and contains some interesting examples of ornamentation, many of which are represented here to night. We left Paris at 8 o'clock on Tuesday morning, the 18th August, in two double-storied carriages, each drawn by five horses and carrying upwards of thirty persons, for Senlis, examining the churches of St. Denis, Gonesse, and Louvres by the way.

#### ST. DENIS.

At St. Denis we were received by two members of the Chapter, one of whom spoke English very well. The senior member, who was well acquainted with the history of the church, accompanied us throughout our examination, and politely furnished all the information we required. And here I will, in order to avoid repetition, say once for all, that nothing could be more courteous and considerate than the treatment we met with in every case, from first to last, at the hands of the French clergy. In the Cathedrals, either the archpriest, or one or more of the canons, received and welcomed us; the whole building was placed at our disposal, and I was permitted to make my observations where I pleased. They were naturally in turn desirous of receiving any explanations we had to offer, and I can assure you that, as very few of our members understood French, and still fewer of the French clergy spoke English, the task of communicating to each party the pleasant and often interesting remarks of the other, although a very agreeable, became a very onerous one, which brought my powers of speech to an end long before the excursion came to a close. On any future excursion in France, we must certainly have some accomplished gentleman attached to our party whose special charge it shall be to act as interpreter and to do the polite. The Church of St. Denis, as it stands at present, belongs principally to two periods, the Transitional and the Geometrical. The works of both are of paramount interest. Of the earlier building, the west end, and the choir with its crypt, alone remain. It possesses throughout all the strongly-marked Transitional features that we find in so many churches of this district, but there is one circumstance in which, as the representative of their Northern buildings, it requires especial notice; a large number of its contemporaneous windows are not circular, as we should expect to find them, but pointed. As these buildings are by no means to be reckoned amongst the later works of this period, this exceptional circumstance seems to justify the conclusion that the pointed arch made its appearance in arches of decoration earlier in the North of France than in any other part of Europe, but we are by no means thereby justified in assuming, as many French architects do, that St. Denis is the earliest Gothic building in Europe, for in all other respects its treatment is very far removed from that which we are accustomed to look upon as characteristic of true Gothic work. The date which M. Felix de Verneilh has attached to this Transitional work of St. Denis is 1137, and he asserts that the western portion of the church, comprising the two west towers and the first compartment of the nave, was finished and consecrated by Abbot Suger in 1144; he also asserts that the choir and its surroundings, which are certainly of later character, were commenced and carried on immediately afterwards, and that the whole church was finished in the same style by Abbot Suger. But this statement relies upon an early document, of a very complete nature, it is true, but one of which M. Viollet-le-Duc greatly questions the authenticity and truthfulness. It is, of course, impossible for me here to enter into this question, but I will point out to you some of the later details of this work. Upon this building a great inroad was made in the Geometrical period, when the nave and transepts were taken down, and the magnificent design



which now occupies their place was interpolated between the western towers and the choir. I am disposed to consider the main idea, as I have been accustomed to call it, of the nave and transepts of this church, as presented in a single compartment of these two members of the cross, as amongst the very finest, if not the very finest, example of Gothic work in Europe. It does not enter into my plan to attempt to give any description of it here, but I would suggest to any one who may be inclined to question this assertion, when he visits St. Denis, as all lovers of the purest and noblest Gothic work should not fail to do, to place himself at the top of the stairs leading from the north transept to the choir, and to look to the south-west diagonally across the crossing—thus taking into his view both the nave and the south transept—in order to enable himself to arrive at a just conclusion on this point.

#### GONESSE, LOUVRES, AND SENLIS.

The Church of Gonesse has a very interesting Transitional choir, with a circular aisled apse and south tower, and with original flying buttresses very like those of Canterbury Cathedral, Sens Cathedral, and the south transept of Soissons Cathedral. It has also a characteristic nave and west front of the Lancet period, of the details of which illustrations are on the walls. At Louvres we find an interesting Flamboyant church, with a well-preserved Late Romanesque doorway at the west end, and a picturesque detached south-west tower of somewhat later date. At Senlis we found the archiprêtre of the cathedral, and a deputation of the Archaeological Society of the Department, awaiting our arrival in the cathedral. The student who visits this building for the first time meets with one of those surprises that are not uncommon in French cathedrals: in approaching it from the south side he sees before him a building belonging apparently entirely to the later phase of the architecture of the Curvilinear period, which has very fitly been called Flamboyant. He enters, and finds himself in a church the whole of the essential parts of which belong to the Transitional period. The lower part of the west front, and part of the east end, with its circular apse and radiating chapels, are the only parts of the original design which show on the outside. The transept ends are, above all, remarkable examples of the profuse manner in which the Flamboyant architects lavished their ornamentation in clothing and overlaying the work of their predecessors. The upper part of the west front, with its remarkable spire, excellently illustrated by Mr. Johnson, belongs to the Lancet period. The central west doorway is a good example of the remarkable sculptured doorways of the Transitional period of which the west doorway of Chartres Cathedral is one of the earliest in the North of France, and that of the south porch of Le Mans Cathedral is one of the richest. We next visited St. Pierre, a desecrated church, now occupied as the stable of a cavalry regiment. It has an interesting early tower attached to its north transept, and a very pretty Flamboyant west front, with much elegant though late detail in its three doorways. At St. Frambourg we find a vaulted apse chapel of a single span, of the Lancet period, with an eastern apse and a large circular west window, possessing some details of interest. It has been illustrated by Mr. Johnson. St. Vincent is a plain broad lofty apse church, which is covered throughout with quadripartite vaulting resting on half shafts on the walls. It belongs entirely to the Transitional period, and has pointed arches of construction, and circular arches of decoration. A plain tall tower on the west side of the north transept, appears to have been added at a somewhat later date. The Vice-President of the Archaeological Society, M. Felix Vernois, and his son-in-law, honoured us with their presence at dinner, and the former showed us, previous to our departure, the recently discovered remains of a Roman amphitheatre which had been brought to light chiefly through his instrumentality and the persistent faith of a zealous archaeologist of Senlis, who had determined, in the face of universal incredulity, to discover the amphitheatre in the very spot where, in fact, it was discovered. An incident happened to some of our friends in Senlis which I will venture to relate, though it is not of an archaeological character. Hotel accommodation being of a very scanty kind at Senlis, our purveyor had bargained with the keepers of a ladies' seminary, where the latter had

gone home for the holidays, to allow us to have the use of the ladies' dormitory for thirty of the junior members of our party, and some fifteen or twenty of these gentlemen had accordingly set out after dinner in quest of their quarters. Now, there happen to be two ladies' boarding-schools at Senlis, and, as ill-luck would have it, when these gentlemen asked for the "*Pensionnat*," they were directed to that which the young ladies had not vacated. I leave you to imagine the astonishment and indignation of the proprietors when these gentlemen knocked at the door, walked into the house, and persisted, in their bad French, in demanding the accommodation they believed to be their own. I believe that the lady and gentleman who owned the establishment discovered at last that what they at first looked upon as a bad practical joke, was really a mistake, which, when they really understood, they enjoyed, together with the young ladies in the background, quite as much as their visitors, whom they very politely put in the way to discover their true lodgings.

#### MONTATAIRE, ST. VAAST, MELLO, AND CIRELES-MELLO.

From Senlis, "*La docte caravane*," as our archaeological friends there humorously named us, passed on the next morning through the villages of Montataire, St. Vaast, and Mello to the station of Cires-les-Mello, whence we took train to Beauvais. At Montataire we were enabled to compare a modest but characteristic and interesting nave of the Lancet period, with a more ambitious but equally characteristic choir of the Geometrical period, and to trace the gradations of form in their respective ornamentation which connect the one period with the other. The nave has peculiar examples of the broad, plain lancet windows, whilst the choir presented tall traceried windows of the early unfoliated Geometrical form. The Church of St. Vaast, which is cruciform in plan, with very short transepts, has a very narrow Transitional nave, with characteristic pier capitals of varied design, several of which are on the walls; it has also two doorways of the same period, one under a west porch, and the other with a very remarkable tympanum of figures and arcade on the south side. The rest of the church—transepts, crossing, central tower, and apse—belongs to the Lancet period, and is extremely picturesque, whether seen from the interior, or outside from the east end, where the pyramidal group, crowned by the saddle-backed central tower, is very striking. At Cires-les-Mello we have in its nave another interesting example of a North French church of the Lancet period, which compares well with that of Montataire, and affords us a good opportunity of perceiving how great a difference there is between the work of this period in France and that of the same period in England. There is a west door and a north porch, both containing interesting features, and a well-buttressed south-west tower forms, with the west front, a very picturesque design. The church at Mello, formerly collegiate, has been so thoroughly restored as to have lost much of its authenticity and primitive value, scarcely a single piece of ornamentation having escaped the modern chisel. It is a cross church of some interest, with a very short nave and transepts, which has lost its choir. It belongs to the very close of the Transitional or the commencement of the Lancet period, and has a south doorway, which, before it was restored, must have been very interesting. We left our carriages at Cires-les-Mello, and reached Beauvais by rail in time to see the Cathedral and St. Etienne the same afternoon.

#### BEAUVAIS CATHEDRAL AND ST. ETIENNE.

I think few will hesitate to admit that if the choir of Beauvais Cathedral be not the most beautiful, it is certainly the most sensational Gothic interior that exists. Its height from the floor to the top of the vault is 154ft., which is that of an ordinary Lincolnshire tower and spire. It is 13ft. higher than Amiens Cathedral, the design of which has been favourably compared with that of Beauvais by Professor Whewell, who, apparently, prefers the former, and graphically illustrates the effect produced on his mind by comparing Amiens to "a giant in repose," and Beauvais to "a tall man on tiptoe." The interest attached to the extremely old work of La Basse Ouvre is rather of an antiquarian than of an artistic kind, and appeared to have little attraction for our party. The Church of St. Etienne has been a very important Transitional structure,

of which the main portions still remain. There is a great deal of rich carved work on the north front of the north transept, and on the north doorway of the north aisle. The choir is of late Flamboyant design. We were attended at Beauvais by M. Vaudremer, the Government Architect for the Department, by the members of the Archaeological Society of the Oise, and by M. Auxcoastdeaux, an architect, who conducted some of our members to some early specimens of street architecture of much interest. We left Beauvais on Thursday morning, at half-past six o'clock, by rail, for Cires-les-Mello, where we rejoined our carriages in the prospect of a charming day amongst the parish-churches of the Valley of the Oise, in which we were not disappointed.

#### CHURCHES OF THE VALLEY OF THE OISE.

At Beaumont-sur-Oise we have a noble five-aisled church commenced at the close of the Transitional period, and completed in the Lancet period. I ought not, perhaps, to say completed, for the clerestory of the nave is wanting; whether it was ever constructed or not it is difficult to say, but the nave is lofty even without it. There exists no better illustration than this church presents of the affinity between the styles of the two periods. Students not knowing where to look for the indications which distinguish them might easily suppose the building to be altogether in one style, and built from the primitive design, which, however, is not the case. There are numerous illustrations of the ornamentation of both its eastern and western parts on the walls. Perhaps the most picturesque church in the Valley is that of Champagne, with its tall central tower, which, however, was unfortunately covered with scaffolding, preparatory to one of those fatal restorations to which the French are so prone. However, it has been already stereotyped by Mr. Johnson, and one or two of our members succeeded in transferring some of its doomed details to their sketch-books. It belongs, like so many other churches of this district, to two epochs, the Transitional and the Lancet, with a clerestory to the nave of Geometrical date, and a south porch of Renaissance work. At Auvers we have also the choir and crossing Transitional, and the central tower, nave, aisles, and west front of Early Lancet work. The nave may be taken as a typical example of Lancet work throughout the whole of this country. At Jouy-le-Comte we find a picturesque central tower of Geometrical date over an earlier crossing, and some points of interest in the choir. We quit the Valley of the Oise with regret, for at Pontoise there are two churches of interest, and a magnificent barn attached to the Abbey of Maubuisson, near the town; but in crossing to the station on the Western Railway, which is to take us to Paris, we pass the Church of Taverny, which completes the beautiful series of parish-churches, chiefly of the Lancet period, that we have visited during this third day of our carriage-drive through a very interesting district, which has furnished us with abundant materials, as well for our sketch-books as for instructive study. Now having thus detailed the work of the first three days that we travelled by carriage, I will not say much of what we saw during the remaining ten days of our excursion, first, because I shall have occasion to refer to much of it in going through these diagrams; and, secondly, because I hope, with the consent of the gentlemen who have furnished these diagrams, to present a more permanent record of this excursion. I will content myself, therefore, with stating that on Friday we went to Mantes and Evreux, on Saturday to Chartres, on Monday, the 24th, to Soissons, on Tuesday to Rheims, on Wednesday to Laon, on Thursday to Chalons-sur-Marne, and on Friday to Rouen.

#### WHAT THE EXCURSIONISTS LEARN'T.

Having thus told you what we saw, I have now to fulfil my promise to tell you what we learned. But I don't suppose that, in saying that, anyone present understood me to mean that I would tell you all that was learnt by the party during this excursion: to do that would require many more hours than we have at our disposal this evening. As this was impossible, it appeared to me that I should serve your purpose better, and employ my time to greater advantage if, instead of attempting to give you a general summary of the many lessons which these great works teach us, from a scientific and artistic point of view, and doing this superficially, I devoted my efforts this evening



to one particular branch of this great art of building during the Middle ages in the North of France, and to do this thoroughly. Having thus concluded, I had no hesitation in selecting the carved work of these early buildings as the particular subject to bring before you to-night, first because the progress of art in this district is more readily traced by its ornamentation than by any other of its features—for we have not in France that infallible test of the date of a building and of this progress in art that we have in our own country—I mean the changing profiles of its moulded work; secondly, because there can be no doubt that if we are to select that part of a building in which is centred the chief character of the building and spirit of the design, it is at that point where the descending arches fall upon the capitals that crown the piers; and lastly, it is one which, for this reason, most artists seek to fix in their minds and transfer to their sketchbooks. In making my selection, then, from the sketches which were kindly placed at my disposal, I chose those drawings which best illustrated this subject; they present a very complete series of illustrations of two periods of French art in the North—the Transitional and the Lancet. They are all enlarged, chiefly by the artists themselves, on a system and in a manner which I suggested to them, in order to fit them as wall diagrams for use this evening; and I think you will agree with me, considering that they do not represent more than a fractional part of the drawings that were made, and are contributed only by some fourteen or fifteen gentlemen, that they give good evidence of the industry of the party during the thirteen working days that we passed in France. Now these drawings speak for themselves; indeed, anything that I may say will only be for the purpose of stringing them together, if I may use the expression; and that, in fact, is almost done ready to your hand by the order in which they are placed on the walls. You will learn more, indeed, to-night by making a good use of your eyes than you will in listening to my words. But I cannot let this occasion pass without insisting on the advantages which the joint action of a party such as the one we have succeeded in bringing together and in keeping together now for five years, offers, when we come to bring our labours to a common centre, and to present them as we do here to-night. Certainly by no other means could so much evidence on one particular subject be brought together so easily and so effectually. The whole of the drawings on the walls, with the exception of my own, are from sketches made by members of the party during the excursion. My time was too much occupied to permit of my making a single sketch; I, therefore, considered myself privileged to contribute to the collection those which I made before the excursion; they comprise also a few introduced from other buildings, not included in the excursion, for the purpose of comparison. And here I may say that there are two buildings the comparison of which with one another, and with the buildings we visited, is almost essential to those who are interested in the study of the Transitional architecture of the North of France. I mean Noyon and Le Mans. They were both too much out of our way to permit of my including them in our programme. I have, however, contrived to fill up this blank by contributing illustrations of their characteristic ornamentation, which, you will see, is of a high order.

#### CHARACTERISTICS OF THE ORNAMENTATION.

Mr. Sharpe then proceeded to draw attention to the numerous diagrams on the walls, with a view of pointing out the characteristic ornamentation of the various styles. He remarked that there was very little Romanesque work in the North of France. He said that nothing could more conclusively prove that the great buildings of the Mediæval period in France and elsewhere emanated from one common centre than the strong family likeness which was to be traced between the ornamentation in use in different countries, and the remarkable manner in which the ornamental details of one period were transmitted, in modified forms, to succeeding periods. The writer who could ascribe such beautiful ornamentation, exhibiting, as it did, a continuity of design from period to period, to the haphazard results of mere workmen's labour must be strangely ignorant of his subject—ignorant of the most elementary truths of architectural art. In this country in particular, no one who had studied the mouldings of the different periods could be-

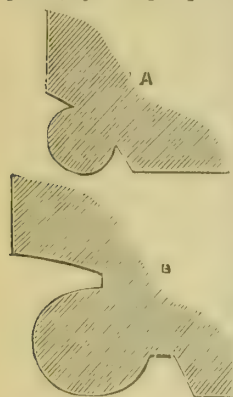
lieve that they resulted from the happy coincidence of the efforts of mere workmen. The more Mediæval buildings were studied, the more evident it became that they emanated from some common centre or centres, of what nature he was not prepared to say, but he was inclined to think that in Mediæval times no one was allowed to design a building for execution unless he had spent thirty or forty years in the continual study of architecture. In the district traversed by the excursionists there were only three or four examples of Romanesque work. The Romanesque period, too, was a very short one in France. In the Church of Montmartre, on the site of which there had been a pagan temple, there were two capitals which were evidently Roman. There were other instances of this kind, as at St. Remi, where considerable quantities of Roman remains had been utilised, some as mere materials, and other parts as ornamental details. These details were copied with modifications by the Early Transitional builders, and he believed, from this, that much of the so-called Byzantine work was not Byzantine at all. In much of the early work they saw what was evidently an adaptation of the Roman acanthus, and this was to be traced, in modified forms, through all the succeeding periods. Of the Transitional period there were at Chalons a series of magnificent capitals of this type, and in the Chapel of the Hôtel Dieu there was also a great variety; also at Montmartre, St. Etienne, and Beauvais. Another feature of the Transitional period which lasted for about twenty years, was the volute curving the reverse way. It was astonishing, said Mr. Sharpe, what versatility of invention was continually being displayed. Even within the compass of one small building, the Hôtel Dieu, the ornament was treated in an almost endless variety of ways. Another characteristic difference between Romanesque and Transitional consisted in the capitals of the latter being all hollow instead of convex upon the surface, and they had a sort of neck, the hollow-necked capital being a distinctive mark of the Transitional period. It had a sort of overhanging leaf, as at Noyon, Laon, Le Mans, St. Remi, and the Hôtel Dieu. At Sens Cathedral there was some very singular ornamentation. It was difficult to make out what it was, but it looked as if it were meant to be subsequently carved into foliage. The same kind of thing was to be seen at St. Cross, near Winchester. Coming to the Lancet period, which was marked by the introduction of a sort of foliated oak-leaf, rather sprawling, and not very beautiful, Mr. Sharpe pointed out one very marked feature of French work, the beautiful crocketed capital, as seen at Chartres, Laon, St. Vaast, Chalons, and Beaumont. This period was also marked by the curious manner in which the French finished the bases of their columns with a sort of leaf or spur, or some piece of ornament to cover the space left between the circular part of the base and the square part. It was said that architects only studied this work to copy it. But why should they do so? The Mediævalists did not copy each other, but imbued themselves with the spirit of their art, and suited it to the times in which they lived. What an infinity of ornament was to be seen in the Mediæval work! Look at the churches of Lincolnshire, all built within thirty or forty years. Was one church like its neighbour? No. And when modern architects were thoroughly imbued with the spirit of the style in which they designed, then only might they hope to design original buildings suited to the wants of the present day. Only by being thoroughly imbued with the spirit of a style would a man be able to design correctly and with originality in that style. Mr. Sharpe having expressed his indebtedness to the gentlemen who had assisted him in this lecture by preparing the great number of enlarged sketches, said he intended, with the permission of those gentlemen, to publish a more permanent record of the excursion. If this permission were granted, he should be happy to defray the whole cost of the publication, but of course he should have to make a selection from the drawings exhibited, which, by the bye, did not represent a tithe of the sketches made during the excursion, and were contributed by only fifteen or sixteen gentlemen out of the sixty who went on the excursion. Many of Mr. Sharpe's own sketches were exhibited, and from these we are enabled, by Mr. Sharpe's courtesy, to publish a selection, for particulars of which see "Our Lithographic Illustrations," and the article on "Early French Gothic" p. 745.

#### TRANSITIONAL ARCHITECTURE OF THE NORTH OF FRANCE.

There are a few remarks of a general character I shall be glad to make before I sit down. In the first place, no one, I think, can have gone home from this excursion without having been greatly impressed with the vigour, the originality, and the fertility of invention displayed in the buildings which belong to that period of art to which it is only of late years that we have accorded a separate classification; I mean the buildings of the Transitional period. They are, moreover, far more numerous and important as a whole in the district that we traversed, than those of any other period, and they appear to have exercised in this country a far greater influence over the style and character of the works of the succeeding period than was the case in England. Indeed so few are the changes introduced into the architecture of the North of France during the period that corresponds with our Lancet period in England, that it may be almost regarded as a continuation of the style of the Transitional period, whilst the earlier use of the pointed arch in arches of decoration in the Transitional period still further reduces the points of difference that in this country distinguish the two periods. In the next place, we cannot fail to be struck with the manifest difference that exists between the work of our own country and the contemporaneous work of the North of France during the Lancet period. Here we have the clustered pier, with its light detached banded shafts; the circular capital, with its round-edged abacus, and elegant bulbous conventional foliage; and the deeply-moulded pier-arch of several orders. There we have the single columnar pier; the square capital with its chamfered corners and its square-edged abacus, and its plain crocketed capital, varied, perhaps, with a plain flat foliated leaf; and the plain pier-arch of two orders, carrying uniformly a single relieved roll at the corner of each order. Here in England we have a tall hooded lancet window, of which the window-arch on the outside and the scoinson-arch on the inside are enriched with deep mouldings, and the jamb with a banded nook-shaft; there in France we have a plain, broad-pointed window without mouldings or ornamentation of any kind. The one is the earliest embodiment of the spirit of what we are accustomed to look upon as Gothic work; the other breathes throughout the spirit of the style from which it took its origin, without its richness, its variety, and its inventiveness. Thus the easy and natural transition by which our own architecture gradually passed at the end of the twelfth and the beginning of the thirteenth century from the earlier styles into the fully-developed Gothic of the middle of the latter century can hardly be said to have had any existence in France. French architecture, in fact, passed almost directly from that of the Transitional period to that of the Geometrical period. As to the duration of the Geometrical period in France, I will not now offer any opinion, but I am disposed to believe that Geometrical tracery, introduced as it was into French work some fifteen or twenty years sooner than it was into English work, continued in use long after Curvilinear tracery was practised in England. If the fine traceried windows with which the south chapel of the Cathedral of Mantes is filled were really constructed by Philip le Mauvais, as French architecturalists assert, then the use of Geometrical tracery must have been continued in France as late as the latter part of the fourteenth century. But I am disposed to doubt the authenticity of this date, though the stained glass which fills them carries his arms. Of the work of the Curvilinear period in France I will just say one word. Whatever may be thought of the works of the latter part of the period when its essentially Flamboyant character became strongly developed, it is impossible not to recognise in the works of the earlier part of the period all the essentials of a great national style. Such an example is the nave of St. Ouen at Rouen, which compares not unfavourably with its earlier Geometrical choir. But of all the designs of the Curvilinear period, either in France or in any other country, there are few superior to that of the west front of the Cathedral of Abbeville; its great height and extreme richness are of themselves sufficiently striking; it has also the advantage which the west fronts of few French cathedrals possess—with its two towers, its three great porches, and its large west windows—of being symmetrical and complete. The architectural student who would lay down for us a correct geometrical elevation of this fine front



would render a great service to all those who are interested in the study of the richer forms of Gothic art. I have only one other remark to make. To an English student nothing is more remarkable than the extreme poverty of the moulded work of these two great periods of French art. From the commencement of the Transitional period down to that of the Geometrical period, we have, almost invariably, one mode only of ornamenting the pier-arch, that, namely, of placing a roll at each edge of the order. In the earlier period this was relieved, as in our Norman period, by a simple quirk as at A; in the Lancet



period the same form occurs, only the relief is greater, as at B. Now, gentlemen, we have traced the progress of a great art, the art of carving in stone, through two very interesting periods, comprising together about 100 years, that is to say, from 1130 to 1230, in a very interesting district. In order to do this satisfactorily, these diagrams have been arranged in their chronological order, without any regard to the particular building, or the particular part of a building, in which they exist; but in gaining this advantage of a general nature, we have sacrificed a minor one of a particular kind, which nevertheless is one of considerable interest; it is that which we derive in observing the progress of art in each separate building during the course of its construction; and were it possible, now that we have made this general comparison of the works of one building with the works of another, I should be very glad if I could, with the wand of a magician, change the places of these diagrams so as to gather together and to compare with one another the illustrations of each separate building. We are not, however, on our own premises, and I regret that this very uncommon collection of drawings, which it is scarcely possible to appreciate, and certainly not to examine and study properly here this evening, will have to be broken up and dissipated tomorrow. Mr. Sharpe concluded by moving "That this Association returns its thanks to the French clergy for their courtesy and attention, and for the facilities they afforded to the members of the excursion for seeing the various buildings visited."

The Rev. W. HUTCHINSON, rector of Checkley, Staffordshire, seconded the motion, which was carried by acclamation.

Mr. PENROSE, as one of those who had taken part in the excursion, proposed "That the thanks of the Association be accorded to those gentlemen of our own profession in France who helped us in our pursuits during our excursion to France in August, 1874." At Beauvais, M. Auxcoastdeux accompanied the party, and M. Vaudremer, one of the Government architects, came expressly from Paris to Beauvais to meet the excursionists; while at Laon they were most courteously received by M. Boeswilwald, who came expressly from Bayonne to meet them. These gentlemen took the utmost possible interest in the excursionists, and spared no pains in explaining and showing everything of interest.

Mr. E. C. ROBINS seconded the motion, which was, of course, carried by acclamation.

Mr. SHARPE said he claimed the right to move a vote of thanks to the gentlemen who had assisted him by preparing the diagrams on the walls, and he did so with considerable pleasure. The gentlemen who had assisted him in this way were Messrs. H. Avern, Baldwin, Barlow, Brown, S. F. Clarkson, R. T. Conder, Drew, Eales, Fowler, T. Garratt, Henman, Johnson, Kersey, Paice, Penrose, Robins, Vacher, Waddington, and W. J. Wood. He also included in the motion Messrs. Cutler, Hayes, and Vacher for assisting him to arrange the diagrams on the screens.

Professor DONALDSON, in seconding the motion, said he had seldom or never seen such a set of lecture diagrams, and he hoped that such would become more common. He hardly thought, however, that Mr. Sharpe had done full justice to the influence of Byzantine art in France. Perhaps at some future time Mr. Sharpe would go into it more fully, and consider it in conjunction with the influence of pointed arch.

This motion was likewise carried by acclamation, and

Mr. W. A. WADDINGTON, of Burnley, replied. Mr. SHARPE then moved "That the best thanks of the Association be given to the officers of the Association who had charge of the excursion arrangements, for the admirable way in which everything was managed."

Mr. WATKINS, of Lincoln, seconded the motion, which was carried, and responded to by Mr. Clarkson.

Professor KERR being called on for a few remarks, said no words of his could adequately express the esteem he felt for Mr. Sharpe, who was both an expert and an amateur. Although he had retired from practice for twenty or twenty-five years, he still maintained an ardent interest in the well-being of the architectural profession, and his services in connection with these excursions must be invaluable.

Sir HENRY DRYDEN, Bart., of Canons' Ashby, said he cordially endorsed all that could be said of Mr. Sharpe, and he highly esteemed and admired him because, as an antiquary, he was engaged in teaching his brother architects to be antiquaries also. He need not say how much damage had been done to our ancient buildings of late years because architects were not antiquaries. Whenever an architect obliterated a single bit of old building he obliterated for ever one line of his country's history.

The CHAIRMAN, in proposing a vote of thanks to Mr. Sharpe for his lecture, said that Mr. Sharpe was well known for his "Parallels," but it would be difficult to find a parallel to his great kindness in conducting, with so much kindness and labour, the yearly excursions of the Association.

Mr. PHENE SPIERS having seconded the motion, which was carried with great enthusiasm, Mr. SHARPE briefly replied, remarking that, much as had been done in the way of sketching, he hoped that on future occasions the work of illustrating the buildings visited would be done in a more systematic manner.

Thus ended a most successful meeting. A number of members who took part in the excursion came to London specially to attend the lecture. These included Mr. W. Henman, of Stockton-on-Tees; Mr. J. Fowler, Mayor of Louth; Mr. J. M. Gething, of Stourbridge; Mr. E. Beloe, of Lynn; Mr. Watkins, of Lincoln; Mr. W. A. Waddington, of Burnley; the Rev. W. Hutchinson, of Checkley; the Rev. W. Blathwayt, of Leigh, Cheadle, &c.

## Building Intelligence.

### CHURCHES AND CHAPELS.

MANNINGTREE. — The parish-church of Manningtree was reopened on Friday last, after restoration, at a cost of £300, under the superintendence of Mr. William Rivett, architect, of that town. In the place of the ancient wooden window-frames on the north side, there have been substituted three new windows, Gothic in style. On the south side a new wall has been built, as far as the chancel, by Mr. F. B. Capon, builder. The roof of the church and the wooden columns have been coloured with a light blue, the trusses and arches being picked out somewhat darker. The caps of the columns have been coloured with shades of yellow and white. The altar has been considerably enlarged so as to embrace the whole of the reredos.

### BUILDINGS.

GLASGOW. — The foundation-stone of an important addition to the Kelvingrove Museum, Glasgow, was laid on Saturday afternoon. The style of architecture of the new wing, at the south end of the present building, is Roman Doric. It will consist of a large hall, 100ft. long and 40ft. wide, with galleries all round, at the height of 14ft. from the floor. The galleries will be lighted from the roof, while the lower flat will obtain light from seven windows on the south side and four on the north side. To the west of the large hall will be a room 40ft. long by 20ft. broad, which it is intended to use as an aquarium. The entrance-halls will be fitted up with columns and panels, on which will be placed figures in bronze. The south and north walls will present an entablature of the Doric order, surmounted by balustrades, with pedestals at intervals, and pierced by seven windows; while the west wall, where the aquarium will be placed, will be of rustic ashlar, with an entablature and blocking course over.

THE MANSION HOUSE. — The salvi, loggias, and vestibule of the Mansion House have just been newly decorated by Messrs. Gallow and Co., under the direction of Mr. Horace Jones, the City Architect. The cornices, mouldings, and trophies in the vestibule have been richly gilded. The loggia opening from the vestibule does not present so brilliant a display. The dado, and the base-ments of the columns and pilasters which support the entablature, are in maroon, varnished; the walls above the dado are in Pompeian red, with a well-chosen flat ornamentation in neutral blue, the lower half of the columns and pilasters being also of red; the upper half of the columns, as well as the projecting portions of the architecture, are in a delicate vellum white, which, upon the beams and in the coves, is relieved with Grecian tracery, the raised ornamentations and mouldings being either solid gilt or etched with gold. The raised portions of the pillars between the flutings are also gilt from top to bottom. In the panels use has been made of Wedgwood blue, which harmonises with the vellum white. Round the entablature runs a flat scroll ornament, and above this is a plain gold moulding beneath the frieze which is a flat Greek tracery in red and gold, on a ground of neutral blue, the City arms being effectively introduced. The doors leading into the other reception-rooms are in maroon, with gilt mouldings, and the reliefs above the doors are in plain blue and white, encircled with a narrow band of gold.

### TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions to our correspondents. The Editor respectfully requests that all communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondence.]

TO OUR READERS. — We shall feel obliged to any of our readers who will favour us with brief notes of works contemplated or in progress in the provinces.

All letters should be addressed to the EDITOR, 31, TAVISTOCK-STREET, COVENT-GARDEN, W.C.

Cheques and Post-office Orders to be made payable to J. PASSMORE EDWARDS.

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RECEIVED. — J. W. and J. C. F. — J. H. — J. C. A. — C. B. A. — B. B. — S. B. and Co. — Vit. — J. C. — J. F. A. — Vital. — W. W. — An Old Subscriber. — A. and G. and Co. — B. and Co. — C. B. A. — G. H. G.

ALF. TAYLOR (in all probability Chislehurst or Sevenoaks would suit you). — AN EARLY SUBSCRIBER (Your suggestion as to a general index of all the volumes published of the BUILDING NEWS is quite impracticable. It would inevitably involve a loss of scores of pounds). — A SUBSCRIBER (We do not think that Mr. Charles Turner, in Reply 3591, meant that he would supply drawings and specifications to any individual subscriber who might apply to him through the post. In fact, no subscriber is entitled to expect such a thing. What, no doubt, Mr. Turner meant, was that he would give the desired information through our columns).



## Correspondence.

## WALL LECTERNS AND PULPITS.

(To the Editor of the BUILDING NEWS.)

SIR,—The wall lecterns of the refectories of Chester, Beaulieu, and Shrewsbury, are corbelled out; that of Beaulieu is used by the preacher, and is very inconvenient from its lateral position. But the flights of stairs giving access to the former occupy much space, and a moveable wooden lectern in hall at the break of the dais was found sufficient for reading the Gospel on certain days in college halls. A far more worthy model is that of the pulpit in the nave of Wells Cathedral, where the preacher is not raised upon a pillar, as in the choirs of Worcester and Winchester. At Chichester the wall lectern has also only a slight elevation. A pulpit ought to command a view of the congregation to be addressed, and if much raised, that in the nave of Wolverhampton, with its noble stairs, is a splendid example. Reading and preaching require different architectural accessories. The more modern nave pulpits of Hereford and Norwich were moveable.—I am, Sir, &c., MACKENZIE E. C. WALCOTT.

## ST. SAVIOUR'S, OXFORD-STREET.

SIR,—I am sorry that I was unable to send you an account of the above in time for last week. What you have published, however, is quite enough, I think. I did not know how fully you intended to give the details, otherwise I would have pointed out that in carrying out the building they were modified in certain points, and in tracing the perspective some of these might have been altered.

Perhaps, if you have space, it might be as well to state that some of the details, which are taken from the original working drawings, were modified in carrying out the work. For instance, the glass tiles shown in the roof detail were omitted, and the ventilating dormers, instead of being framed in wood, were made in one tile, from the architect's design, by Mr. Cooper, of Maidenhead. The groined ceiling was intended to have stone ribs and brick filling-in, as indicated in the drawing, but, from motives of economy, it was found necessary to substitute wood. The apse, however, is groined, as originally intended, and the springers in the octagon until the ribs become disengaged are in stone. The central opening in the groining is fitted with a sunlight, and the somewhat peculiar framing of the roof was designed to admit of a ventilating shaft over it. In other respects I think the details were all carried out as shown on the working drawings you publish.—I am, Sir, &c.,

ARTHUR W. BLOMFIELD.

## NEW SHOREHAM CHURCH.

SIR,—I have read Mr. Jarvis's letter on the "restoration" of New Shoreham Church. I have myself seen with horror what has been done, and can corroborate all he says as to the scraping and patching of the stone with cement.

The destructive work is the more to be regretted, as I am told the gentleman under whose direction it was done is the late secretary of the committee which, in 1866, was formed to carry out, under Mr. Slater and myself, the rebuilding of the destroyed nave and the restoration of the chancel, for which my father, so long ago as 1846, had prepared plans. This scheme is at present in abeyance; but having so great and special an interest in this noble church, I felt it my duty at once to draw the attention of the gentleman himself and the proper authorities to the manner of doing the work, and I believe the matter will receive their fullest consideration.

The east end really required but very little repair, and that of the most conservative kind; for, although some stones were honeycombed on the face, they were quite hard. I have found, from experience in the neighbourhood, that in some cases Caen stone (of which the church is built) decays like this for a year or two and then hardens; and I find that the newly-scraped surface will be very liable to decay.

It is greatly to be regretted that the enthusiastic interest in his church and desire for its restoration which the late secretary showed had in this case so unfortunate a result.—I am, Sir, &c.,

R. HERBERT CARPENTER.

4, Carlton-chambers, 4, Regent-street, S.W.

Dec. 22, 1874.

## A SAFE AND SCIENTIFIC WATER-CLOSET.

SIR,—Permit me to indorse the remarks by Mr. Phillips on the very scientific and safe w.-c. by Mr. Buchan. I fear that some of your readers will suppose, from the very prominent position you have given to Mr. Buchan's old and complicated ideas, that you approve of them.

Mr. Duffield did not go far enough in his criticism. Please compare the position of the gully and ventilating pipes in Mr. Buchan's sketch (p. 651) with the second paragraph of his letter in defence of same (p. 710).

Has not Mr. Phillips seen the excellent arrangements in earthenware by Mr. Jennings and Mr. Doulton? If we could get rid of the plumber in our sanitary apparatus, we should, at the same time, have less need of the doctor.—I am, Sir, &c., T. S.

[We have received another long letter from Mr. J. W. Duffield, and also a letter from "London Plumber," on this subject, for which we are unable to find room. Both correspondents criticise and generally condemn Mr. Buchan's suggestion.—ED. B.N.]

## Intercommunication.

## QUESTIONS.

[3615].—Ventilation.—A correspondent alludes to "Pott's Patent System of Ventilation" applied largely at Macclesfield. Will Mr. G. P. Duncalf furnish particulars? I should like to know the principle.—G.

[3616].—Slow Combustion Grates.—What do these consist in, and how do they act? Will any correspondent kindly give me some explanation?—L.

[3617].—Roofing Felts.—Can some one inform me which is the best roofing felt manufactured, and in what manner the sheets are to be laid, whether over or under the battens?—BUILDER.

[3618].—Smoky Flues.—For an intolerable nuisance, can any one suggest to me a simple remedy? Every time the fire is lighted in one room it sends the smoke down the adjoining flue, and compels the latter fireplace to be used. Is the defect in the flues? If so, can it be remedied without much inconvenience?—ONE WHO LIKES COMFORT.

[3619].—Cooking Ranges.—I should like to be informed of the latest improved cooking range, and upon what principles it is constructed.—INQUIRER.

[3620].—Granites.—Will some practical reader give me the names of the best granites, modes of working, and other particulars? I believe some capital granites are quarried in Cornwall and Devonshire. Can some one give me particulars of these?—STUDENT.

[3621].—Waterproof Cement.—Can any one give me a recipe for a good waterproof mastic cement? What is mastic cement made from?—INQUIRER.

[3622].—Decaying Mortar.—A cellar, whose walls are below ground, shows in the mortar a complete decomposition or falling away. What is the best remedy, and what mortar is best for stopping?—APPRENTICE.

## REPLIES.

[3596].—Chilmark Stone.—I am obliged to T. P. Lilly for his answer to my question, but I think he must be in error as to the crushing weight per square foot. Has the pressure he gives been actually tested?—G.

[3606].—Air-tight Windows.—I should recommend "Constant Reader" to put strips of thick leather or indiarubber or gutta-percha in the grooves before the plate-glass is inserted. Plate-glass is generally best fixed with screwed fillets, the leather making the work watertight. If this plan is adopted I do not think any sudden concussion (unless a very severe one like a gunpowder explosion) will break the glass.—G.

## CHIPS.

At the Ordinary General Meeting of the Institution of Surveyors, held on Monday, December 7th, the following names were read and passed to be balloted for on January 18th, 1875.—As Members:—George Frederick Grey, 5, Tavistock-street, Covent Garden; William Graham, Victoria Chambers, Newport, Monmouthshire; Charles Grey Grey, Dilton, Corbridge-on-Tyne; David Llewellyn, Pontypool, Monmouthshire; Robert Wilks Mann, 7, Hobart Place, W.; and Whitehall, Hayes; Daniel Cubitt Nicholls, 193, Gray's Inn-road; George James Taylor, 12, Montague-street, W.C.; James Tolley, 13, Angel Court, Bank, E.C.; Edmund Fowle Wood, Chepstow, Monmouthshire; as Associate:—Leonard James Williams, 12 Montague-street, Russell-square, W.C.

The late Mr. Thomas Jump, builder, of Liverpool, has left £45,000 for charitable purposes.

The Dublin Corporation has resolved to ask the Government for a loan of half a million to carry out main drainage works, the loan to be repaid out of the contributions by Government to local taxation.

## Our Office Table.

TEMPLE BAR.—By a majority of 63 to 31 the Court of Common Council has decided to postpone the removal of Temple Bar until a committee shall have considered the best course for facilitating public traffic, and have conferred with the Government and the Commissioners of Sewers in relation thereto. In course of the debate it was stated that six months' notice must be given to Messrs. Childs before the Bar could be pulled down; also, that Messrs. Childs had expressed a desire, when they rebuild their bank, to swing round the bar and make use of it for an entrance.

REYNOLDS' NEW MORTISING-MACHINE.—Messrs. F. W. Reynolds & Co. have just introduced a new mortising-machine, "The Monarch," which combines the most recent improvements that have been made in this class of machinery. Special attention has been paid to the arrangements for adapting this machine to different kinds of work. It is well made throughout, and is mounted on a good solid base, which is of considerable importance to a machine of this kind. Messrs. F. W. Reynolds & Co. have another new mortising-machine, "The Premier," which has a novel arrangement for shifting the bed to any required angle. This is a great desideratum for many kinds of work, and will, doubtless, be appreciated. The "Imperial Saw-Bench" has been considerably improved since its first introduction, and attracted great attention at the Smithfield Club Show. A new sawing-machine is also promised, combining both a circular-saw and band-saw, and fitted with a new patented drag motion.

LEAD ENCASED BLOCK TIN PIPES.—"Tinned lead pipes," or lead pipes merely washed with tin, which are of very little use, are, it may be as well to remind our readers, very different things from the "lead-encased block-tin pipe" manufactured by the Patent Lead-Encased Block-Tin Pipe Company, of Liverpool and London. This is really a double pipe, the interior tube being of pure tin about 1-10in. in thickness, protected on the exterior by the usual lead pipe. The pure tin is as ductile as the lead, and the compound pipe can be bent in any direction as any other, while it affords perfect protection against lead-poisoning in water and other liquids. Householders who may be in trouble with the renewal of their water-pipes this frosty weather should obtain a sample and price list.

VENTILATION OF THE BRITISH MUSEUM.—The subject of ventilation at the British Museum has been attracting attention. A short while ago it was stated broadly that Mr. Warren, a valuable official in the Museum, had died of complaints generated by the atmosphere of the room in which he worked; and now Mr. Walter Thornbury has brought the ill-ventilation of the reading-room before the public. In reference to the matter it may be stated that the Trustees of the Museum have been considering as to what can be done to remedy the evil, and steps have already been taken in some degree to improve the ventilation of the various offices, and also the reading-room, and it is understood that the sanitary reformation will be thorough.

THE LAST OF HANOVER SQUARE ROOMS.—Saturday night saw and heard the last concert of that long series which have been held in the Hanover-square Rooms for just 100 years. The rooms were built by Gallini, the Swiss dancing-master to the family of George III., and that sovereign used frequently to attend the concerts which he gave. Gallini retired with a fortune and a knighthood, and his nieces inherited his fortune. On their death in 1845, Mr. R. Cocks, the music publisher, bought the freehold, and he has now let the building on a lease of 21 years to the Cercle des Etrangers, the club for foreigners in London, which has been recently started. A concert-room is thus closed which is generally admitted to have been the best in London, so far as acoustic properties go, but which was a rather dingy and cheerless place.

## CHUBB'S IRON DOORS

AND SAFES.

Fire and Thief Resisting.

CHUBB AND SON,

57, St. Paul's Church-yard, E.C. And 63, St. James's-street, S.W.—[ADVT.]

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## Trade News.

## WAGES MOVEMENT.

LEICESTER.—The carpenters and joiners have resolved that the employers be solicited for an advance in wages of 9d. an hour from 1st June, 1875; that the overtime clause be altered, viz., time and a quarter from six till eight p.m., and that from eight p.m. to five a.m. time and a half; that six a.m. shall be the uniform hour for commencing work in shops, and in all unprotected buildings men shall commence work at seven a.m. and leave at five p.m., six weeks before and six weeks after Christmas, and to receive 4d. per hour extra to men working in shops.

NEWCASTLE-ON-TYNE.—On Saturday night a large gathering of the joiners employed in the shoyards on the Tyne was held in the Presbyterian Hall, Willington Quay-on-Tyne, to take into consideration the notice that has been given by the Masters' Association to the workmen in their employ of a reduction of 10 per cent. on time-work, and 15 per cent. on piece-work, which takes effect on the 1st of February, 1875. It was decided with unanimity to resist the reduction. It was denied that the depression was so great as the masters wished to make out. Mr. Prior and Mr. Garland, of the Amalgamated Society of Joiners, Manchester, and Mr. Patterson, of the Scottish Associated Society of Joiners and Carpenters, Edinburgh, were present, and addressed the meeting, approving of the step taken.

SHEFFIELD.—A very extensive movement for an increase of wages amongst the carpenters, joiners, and bricklayers of Sheffield has just been started. The majority of the men are members of the Amalgamated Society of Carpenters and Joiners, and in 1872 they went in for the fifty hours a week system, at 7½d. per hour. After a struggle of eleven months' duration they got their demands, and have since worked on those terms. The building trade has developed so rapidly in Sheffield, that the carpenters and joiners have decided to make another application for an increase of wages. On the 1st of January they will give notice to the employers that they require an advance of one halfpenny per hour, which is equal to an increase of two shillings per week on the present wages. The demand will apply in the same ratio to overtime. The bricklayers, although in a different society, have decided to coalesce with the carpenters and joiners, and will go in for the same increase, or probably a still greater advance. If the masters do not make the concessions mentioned, there is little doubt that a long strike will ensue. The Amalgamated Society is prepared to support the men, and as it has a balance in hand of £38,125, the struggle will probably be not a short one. About 700 men will be affected by the movement. Owing to the flourishing state of the building trade in Sheffield, it is expected that the employers will make the desired concessions, and that a strike will be avoided.

## The Timber Trade.

Wholesale prices of timber, deals, &c.  
Timber per load.

	£ s.	£ s.
Quebec red pine (yards and spars)	4 10	6 10
" (mixed and building)	3 10	4 0
" yellow pine, large	5 10	6 10
" waney board	5 10	6 10
" small	4 0	4 1
Pitch pine	3 15	4 5
" for masts and spars	4 15	6 5
Quebec oak	7 0	8 0
" rock elm	5 10	6 0
" ash	5 10	6 0
" large birch	5 10	6 5
New Brunswick and P. E. Isle birch	2 15	3 0
Small averages	2 10	2 15
Masts, red pine	4 10	6 0
" yellow pine, large	4 0	6 10
" Oregon	9 0	12 0
" Kawrie	8 0	11 0
" Norway spars	2 0	3 0
Indian teak	11 0	14 0
British Guiana greenheart	12 10	13 10
Australian ironbark	8 10	11 0
Riga fir	3 10	4 5
Memel and Dantzic crown	4 0	5 10
" best middling	3 10	4 10
" good ditto and 2nd	3 0	4 0
" common middling	2 15	3 0
" undersized	2 12	2 15
Stettin	3 0	3 10
Swedish	2 10	2 15
" small	2 5	2 15
Swedish and Norway balks	2 0	2 15
Memel crown oak	5 10	8 0
" brack	5 5	
Dantzic and Stettin crown oak	5 10	8 0
" brack and unsquared	5 10	6 0
Wainscot logs, per 18ft. cube.		
Riga crown	5 10	6 0
" brack	4 15	5 0
Memel crown	4 15	5 10
" brack	3 15	4 5
Lathwood, per cubic fathom.		
Petersburg	8 0	9 10
Riga, Memel, &c.	6 0	7 0

## Prepared flooring, per square of inch.

	s. d.	s. d.
Best yellow	14 6	17 6
" white	13 5	14 6
Second qualities	12 6	15 0
Oak staves, per mille of pipe.		
Memel crown	235 0	255 0
" brack	180 0	195 0
Canadian standard pipe	65 0	70 0
" puncheon, per 1,200 pieces	18 0	19 0
Bosnia, single large per do	31 0	32 0
United States pipe	35 0	37 10
" hhd. heavy and extra	30 0	35 0
" slight	17 0	21 0

## Furniture wood, per foot super.

	s. d.	s. d.
MAHOGANY:—		
Honduras, cargo average	0 4½	0 6
Mexican	0 4½	0 5½
Tabasco	0 5	0 6
Cuba	0 6½	0 10
St. Domingo	0 7	0 10
" curls	1 0	2 0
Cedar, Cuba	0 4½	0 5
" Honduras and Mexican	0 3½	0 4½
" Australian	0 3½	0 4½
" Pencil	0 2	0 3
Walnut, Italian	0 4½	0 5
" Black Sea	3 3½	0 4
" Canadian	0 3	0 4
Bird's-eye maple	0 5	0 7
Satinwood, St. Domingo	1 0	1 6

## Furniture wood, per ton.

	£ s.	£ s.
Satinwood, Bahama	7 0	9 0
Rosewood, Rio	14 0	20 0
" Bahia	12 0	18 0
Zebra wood, Puerto Cabello	7 0	8 0
Ebony, Ceylon	12 0	18 0
" African billet	12 0	15 0
Lignum Vitæ, City St. Domingo	6 0	10 0
Cocus wood, Cuba	6 0	8 0
Boxwood, Turkey	5 0	16 0

## Deals, &amp;c., per 120, 12ft. 1½ by 11.

	£ s.	£ s.
United States pitch pine	12 10	15 0
Quebec, 1st spruce	10 0	11 10
" 2nd	8 10	9 10
" 3rd	8 5	8 15
St. John's spruce	9 0	9 10
" battens	8 0	9 0
Nova Scotia and P. E. Island	8 0	9 10
Archangel, 1st yellow	15 10	16 10
" 2nd	12 0	14 0
Petersburg 1st	15 10	15 0
Wyburg	12 0	13 10
Quebec, 1st bright pine	21 0	21 0
" floated	20 0	21 0
" 2nd bright	13 0	14 0
" floated	13 0	14 0
" 3rd bright	10 0	11 5
" floated	9 0	10 0
Holmsund 1 & 2 yel.	4 by 9	13 10
" 3rd	4 by 9	12 10
Husum, 1 & 2	4 by 9	12 10
Ulenborg, 1st	3 by 9	12 10
Gefle 1 & 2 yellow	4 by 11	10 10
" 4th	2 by 9	8 10
Bjorneborg, 1st white	3 by 9	9 10

## WHITLAND ABBEY GREEN SLATES.

These Quarries are now fully opened out, and are producing Slates in all sizes, and in any quantity, sound, and of choice green tint. Orders can be executed without a day's delay. For samples and further particulars, apply to the MANAGER, at the Quarries Narberth-road, R.S.O.—[ADVT.]

## TENDERS.

LONDON.—For the hotel to be erected over the terminus of the London, Chatham, and Dover Railway, on the Holborn Viaduct. Mr. Lewis H. Isaacs, architect. Quantities supplied by Mr. L. C. Riddett.

Gammon and Sons	£75,500 0 0
Holland and Hannen	74,560 0 0
Peto Bros	74,369 0 0
Browne and Robinson	73,580 0 0
Chappell	73,458 0 0
Lucas Bros	73,120 0 0
Trollope and Sons	71,343 0 0
Webster (accepted)	70,000 0 0

LONDON.—For alterations and repairs to the "Star Tavern," City-road. Messrs. Bird and Walters, architects. Quantities supplied.

	With shop-fronts in wood.	With shop-fronts in Portland stone.
Gammon & Sons	£1,550 0 0	£1,575 0 0
Lawrence	1,530 0 0	1,611 0 0
Thompson & Smith	1,411 0 0	1,511 0 0
Anley	1,367 0 0	1,444 0 0
Newman & Mann	1,366 0 0	1,508 0 0
Ebbs & Sons	1,294 0 0	1,356 0 0
Mark	1,285 0 0	1,374 0 0
Brown	1,260 0 0	1,350 0 0
Williams & Son	1,247 0 0	1,317 0 0

\* Accepted.

## BATH AND OTHER BUILDING STONES OF BEST QUALITY

RANDELL, SAUNDERS & CO., Limited, Quarrymen and Stone Merchants.

List of prices at the Quarries and Depots, also cost of transit to any part of the United Kingdom, furnished on application to

BATH STONE OFFICE: CORHAM, WILTS. [ADVT.]

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IN BLOCK OR SAWNS.  
THE PORTLAND STONE COMPANY (LIMITED)  
QUARRYMEN AND STONE-MERCHANTS.  
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For List of Prices and Cost of Transit by Sea or Rail, apply to the PORTLAND STONE COMPANY (LIMITED), ISLE OF PORTLAND, DORSET.  
London Depôts at South Western and Great Western Railways.

## COMPETITIONS OPEN.

PAISLEY, Feb. 1.—For designs with specifications and estimates for the erection of a Town Hall. Premiums of £100 for the 1st, £50 for the 2nd, and 25 for the 3rd best design. Town Clerk, Council Chambers, Paisley.

SOUTHWICK SCHOOL BOARD, Jan. 23. — For plans of a school building to accommodate 360 children. The architect whose plans are selected will have the superintendence of the erection of the building. Mr. T. Hardy, Clerk to the Board, Shoreham, Sussex.

WIGAN. — For designs for a new market house. Premiums of £50 for the best, and £25 for the second best designs. Mr. W. Pease, Town Clerk, Wigan.

Geometrical and Encaustic Tile Pavements in every variety. Over sixty New Designs at 5s. 6d. per yard super. The Tiles are excellent, both in quality and colour. — BUILDING NEWS. "They are of great excellence in design—the material is not surpassed by any found in this kingdom." — *Art Journal*. "For paving conservatories they are the best tiles we have seen; there can be no end to their uses." — *Gardener's Magazine*, &c., &c. Designs and sample Tiles free on application to HENRY C WEBB, Tiles, Worcester.

## CONTRACTS OPEN FOR BUILDING ESTIMATES.

CHATHAM Jan. 3.—For the erection of a new building for 24 workpeople at the paper mills. J. G. Hall, architect, 8, St. Margaret's-street, Canterbury.

DEDDINGTON, Dec. 29.—For building magistrates' room and witnesses' waiting-room. Mr. William Wilkinson, architect, 5, Beaumont-street, Oxford.

DUFFRYAN AND GRAIG SCHOOL BOARD, Dec. 29. — For the erection of a school and master's house at Rhiwderyn, near Newport, Monmouthshire. Messrs. Habershon, Pite, and Fawcner, architects, 4, Park-square, Newport, and 38, Bloomsbury-square, W.C.

DUNFERMLINE, Jan. 5.—For the erection of a school at Milesmark. Mr. Scobie, architect, Dunfermline.

DURHAM COUNTY LUNATIC ASYLUM, SEDGEFIELD, Jan. 9. — Contract No. 1. For the erection of new stabling. Contract No. 2. For the erection of new north east lodge and entrance gateway. Contract No. 3. For the erection of new kitchen. Mr. W. Crozier, M.I.C.E., Assize Courts Durham.

HALIFAX, Dec. 31.—For the erection of two first-class, dwelling-houses in Clare Hall-road. Messrs. Jackson and Fox, architects, 20, George-street, Halifax.

IPSWICH, Dec. 19.—For the erection of a Baptist Chapel. Mr. John P. Kay, architect, 12, Corn Exchange, Leeds.

KEIGHLEY, Jan. 8.—For the erection of the Liberal Club Rooms, three shops, stabling, &c., adjoining the Devonshire Hotel. Mr. W. Smith, architect, Cook-lane, Keighley.

KINGSTON-UPON-HULL SCHOOL BOARD, Jan. 13. — For the erection of school buildings for 900 boys, girls, and infants. Mr. W. Botterell, architect, 23, Parliament-street, Hull.

LEEDS AND YORKSHIRE LAND, BUILDING, AND INVESTMENT CO., Dec. 29.—For the erection of ten through houses on the Hill Top Estate. T. Ambler, architect, 9, Park-place, Leeds.

LEEDS, CASTLEFORD, and PONTEFRAC TUNNEL RAILWAY, Jan. 19.—For the construction of two railways about 7½ miles in length. Mr. J. Fraser, Engineer, 13, Park-square, Leeds.

LEEDS SCHOOL BOARD, Dec. 30. — For the erection of boys', girls', and infants' schools, outbuildings, boundary walls, &c. W. Lee, Clerk to the Board, St. Andrew's-chambers, Park-row, Leeds.

LONDON AND NORTH WESTERN RAILWAY, Jan. 1.—For the erection of a goods warehouse and other works at Chester. Mr. R. E. Johnson, Monks Tarry, Birkenhead.

MONMOUTHSHIRE, Dec. 29.—For the erection of a school and master's house at Rhiwderyn, near Newport. Messrs. W. G. Habershon, Pite, and Fawcner, architects, 4, Park-square, Newport, and 38, Bloomsbury-square, London, W.C.

RADNORSHIRE, Jan. 1. — For restoring and repairing Llandegley Parish Church. S. W. Williams, architect, Rhayader.

RADNOR, Jan. 12.—For the erection of new schoolroom, teacher's residence, &c., at Ffynnongyndy. Mr. J. Lewis, Glasbury.

SOUTH STAFFORDSHIRE MINES DRAINAGE ACT FOR 1873, Dec. 31.—For the execution of surface works. Secretary to the Commissioners, 22, Darlington-street, Wolverhampton.

ST. MARYLEBONE, Dec. 28.—For the breeze, ashes, and dusting. W. E. Greenwell, Vestry Clerk, Court House, St. Marylebone.

ST. MARYLEBONE, Jan. 7.—For the supply of watercarts, horses, drivers, &c. W. E. Greenwell, Vestry Clerk, Court House, St. Marylebone.

WAR DEPARTMENT CONTRACTS, Dec. 31. — For fitting casemates, &c., at Fort Gifford, near Plymouth. Col. A. H. Freeling, Royal Engineer's Office, Devonport.

WIDNES LOCAL BOARD, Jan. 2.—For the construction of about 2,000ft. of brick sewers, with manholes, and other works. Mr. A. Sheldermine, Surveyor, Local Board Office, Widnes.

WIDNES LOCAL BOARD, Jan. 2. — For making up and forming Church-street. Mr. A. Sheldermine, Surveyor, Local Board Office, Widnes.

Epps's Cocoa—Grateful and Comforting—"Eya thorough knowledge of the natural laws which govern the operation of digestion and nutrition, and by a careful application of the fine properties of well-selected cocoa, Mr. Epps has provided our breakfast-tables with a delicately-flavoured beverage which may save us many heavy doctors' bills." — *Civil Service Gazette*. "Made simply with boiling Water or Milk. Each packet is labelled—JAMES EPPS and Co., Homoeopathic Chemists, London." —[ADVT.]

Lamplough's Pyretic Saline is refreshing, most agreeable, and the preventive of fevers, biliousness, small-pox, skin diseases, and many other spring and summer ailments. Sold by chemists throughout the world, and the Dispensary, 115, Holborn Hill. — *Continental Dispensary*. —[ADVT.]























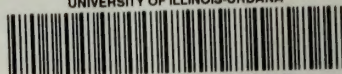








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